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DENTISTRY IN WARTIME GERMANY

Immediately after the surrender of Germany, intensive studies of the German economy in all its phases were initiated through military channels. In the field of dentistry, information was collected on dental education, dental practice, "socialized" dentistry, dental industry and new dental products, such as plastics and "gas-cooled" dental burs. These reports have now been released to the Office of the Publication Board by the War and Navy Departments and provide an intensely interesting examination of different branches of dentistry. The language of the reports* has not been edited except in cases of obvious error or misprint. The reports, with some deletions, follow†:

1. Dental Education in Germany

This review of dental education in Germany is based on interviews with: (1) Prof. Dr. Adolf Klughardt, director of the dental school, University of Jena; (2) Prof. Dr. Karl Hauenstein, director of the dental school, University of Leipzig; (3) Prof. Dr. Otto Heinroth, brother and assistant of Dr. Hans Heinroth, director of the dental school, University of Halle.

There are in Germany two types of licensed dental practitioners: the general dental practitioners *(Zahnarzt),* and the *Dentist,* who is a glorified dental technician but who also carries out certain minor treatments such as the filling of teeth.

Admission to Dental Schools

After the advent to power of the Nazi regime, a *Reichszahnärztekammer* (National Dental Chamber) controlled every phase of dental practice and education including admission to dental schools. Selection of students was based on the following considerations:

The total number of dental students to be admitted each year was determined in Berlin after a survey of national requirements for replacement and new positions.

To date, no one has been found to

*Reports No. 96, 357, 539, 919 and 947, Office of the Publication Board, Department of Commerce, Washington, D. C.

†The Publication Board calls the attention of interested parties to the fact that "some products and processes described may also be the subject of United States patents" and recommends "that the usual patent study be made before pursuing practical applications."

give an accurate official statement as to the total number graduated per year. Dr. Adolf Klughardt, of the University of Jena, estimated a total of five hundred new students a year. This estimate appears low, but is corroborated somewhat by the average size of graduating classes in the universities seen thus far (twenty-five to thirty-five graduates).

In theory, each university was given its pro rata share of the entering students. Ability to modify this number gave the allocating authority a strong lever for control of the university.

To be qualified for admission to a dental school, a student must have finished the equivalent of a high school course, totaling at least twelve years, and hold a *Maturitäts* certificate based on examination at the end of this course. This basic course of training usually included mathematics and sciences above the grade of school level, but they were not required. Latin was required and, if not included in preliminary schooling, a special examination was necessary. Provision was made for admission of students who lacked the required basic schooling, but who showed particular aptitude and ability as determined by long and exhaustive investigation by the dental faculty. Seldom were more than one or two such students admitted to any one university in one year. Political pressure was sometimes exerted to have good party members admitted on this basis.

Qualified students were accepted, in theory at least, on a "first come, first served" basis. Most students paid their own fees, though the government aided a few "worthy" students of outstanding ability or political activity. (During the war, 50 per cent or more of all students were soldiers whose expenses were paid by the government. The government also paid for the dental education of a small number of discharged veterans, estimated at 10 per cent or less of students.)

Course of Study for Dental Practitioner

The course of study was divided into a preclinical course (*Vorklinische Kurs*) and a clinical course (*Klinische Kurs*).

The preclinical course lasted three semesters of about four and one-half months each. The following subjects were included:

- 2 semesters—Prosthetic laboratory
- 1 semester—Dental materials and metallurgy
- 1 semester—Introduction to orthodontics
- 1 semester—Filling operations on manikins
- 2 semesters—Anatomy (with dissection of head and neck in winter months; dissection not considered practical in warm months)
- 2 semesters—Physiology
- 1 semester—Histology
- 2 semesters—Chemistry
- 2 semesters—Physics
- 1 semester—Histology laboratory
- 1 semester—Chemistry laboratory

This course was followed by a rigid examination *(Physikum)* to determine fitness to continue studies. Few students were dropped at this time, however.

The clinical course lasted four semesters and included the following subjects:

- 2 semesters—Crown and bridge construction
- 2 semesters—Prosthetics
- 2 semesters—Orthodontics (practical cases)
- 1 semester—Ceramics
- 1 semester—Instrumentation
- 1 semester—Dental public health
- 1 semester—Treatment of fractures
- 2 semesters—Operative dentistry
- 3 semesters—Clinic for mouth and jaw diseases (1 semester, observation; 2 semesters, practical)
- 1 semester—Dental hygiene
- 1 semester—Pharmacology
- 2 semesters—Pathology (1 semester, general; 1 semester, dental)
- 2 semesters—Internal medicine
- 2 semesters—Skin and venereal disease clinic (lecture and clinic)
- 2 semesters—Surgery (general and dental)
- 1 semester—Ear, nose and throat (lecture)
- 1 semester—Laryngology (observation)

On completion of the full course, the student appeared before the full dental faculty for an examination which included theory and practice, with a write-up of cases assigned for treatment in the clinic. If successful, he was given the degree of *Zahnarzt* (not "Doctor") and could enroll in the National Dental Chamber and practice in state insurance clinics. This examination was under state control, though questions were formulated by the examining committee. It authorized practice anywhere within the Reich.

No dental internships were required, though for economic or professional reasons most graduates spent several years in hospital or institutional clinics or with private practitioners before establishing their own practices.

Men desiring to specialize took compulsory postgraduate courses given in the larger centers. The course for surgery lasted one year; for orthodontics, two years. They then were examined by a professor licensed by the state to conduct such inquiries, the examination lasting about two weeks. If successful, the candidate made application to the *Reichszahnärzte Führer,* or government chief for dentistry, for registration as a specialist. After registration, the specialist could not engage in general practice, but had to limit his activities to his chosen field. The ordinary *Zahnarzt* could practice in these special fields, but could not call himself a specialist.

The course of study for dentistry was not cut from the three and one-half years required before the war. Other factors, however, served to reduce the effective time available for study to a point where all dental educators interviewed felt that courses were dangerously inadequate. Among these adverse factors were:

a. Almost all students were in the military service and devoted the equivalent of one day a week to actual military duties.

b. Staffs of schools were so depleted that they were unable to devote sufficient time to students.

c. Physical facilities were destroyed or seriously damaged by air raids.

d. The necessity for students to spend many hours in air raid shelters during both day and night interfered with classes and study periods.

Enrollment in Dental Schools

During the war, a large but variable proportion of dental students were in active military service. The exact proportion is probably not known by anyone outside of Berlin and cannot be determined at this time. The remaining students were women, discharged veterans and physically disqualified men. At Halle about 25 per cent of students were women, about 25 per cent discharged or physically disqualified men and 50 per cent military personnel. At Leipzig two-thirds of the students were women. At the beginning of the war, students who had had military training were mobilized immediately and sent to line units. Other students were taken from the schools according to their conscription status without regard for scholastic situation except that students within a few months of graduation were generally allowed to complete the course. Former dental students who made good records in line units were transferred after about six weeks to the *Sanitäts Korps,* given noncommissioned grades after a few months and returned to school at government expense. Selected discharged veterans were also returned at government expense, though in small numbers. No students were continued in dental school at government expense without first having served as enlisted men. On graduation, dentists, whether military or civilian, were taken into the Army or, if not physically qualified, were sent to replace dentists taken into the Army. No freedom of choice of place to practice was allowed during the war.

Army dentists were given infrequent courses in oral surgery of about one week in specially designated universities. Such courses usually did not include clinical practice, and comment on them was unfavorable by both dentists and faculty.

In general, the enrollment fell off greatly from 1934 to 1939. Cause of this decline is not clear and will be further investigated. At Leipzig, for instance, nearly 600 students were enrolled in 1934. By 1938, this number had fallen to 150.

Course of Study for Dental Technicians

The classification of *Dentisten,* as distinguished from *Zahnärzte,* originated as a result of attempts of dental laboratory men to engage in treatment of patients. Their position in German dentistry will be discussed elsewhere but the schedule of their professional training is as follows:

Four years public school (twelve for *Zahnarzt*).

Three years as apprentice laboratory man. During this time the student attends a school two mornings a week where he gets the rudiments of physics, chemistry and anatomy.

One year as journeyman laboratory technician.

One year formal schooling at one of six schools.

One year as assistant to a graduate *Zahnarzt.*

He must pass an examination before a board composed of one doctor of medicine, one *Zahnarzt* and one *Dentist.* On graduation, he may not give general anesthesia or practice major oral surgery or orthodontics. He may, however, work on equal terms in the state insurance scheme.

Effects of the War

Most dental schools functioned with increasing difficulty up to the spring of 1945. Damage to buildings and equipment will run from 60 per cent (Halle) to 90 per cent (Jena). No university visited thus far has escaped. Staffs have been scattered and some prominent dentists were involved in Nazi affairs to a point that makes it improbable that they will be available for some time. School authorities are anxious to resume teaching, however, and are already carrying on clinic treatment without students in improvised buildings. How soon they will function again cannot even be guessed at, as the world has never before seen the almost complete destruction of all the principal cities of a large nation. One hears serious estimates that years will be required to clear away present débris. In view of the eagerness of Germans to restore medical education, however, it is believed that partial operation with reduced classes will begin in improvised quarters almost as soon as authority is granted by the occupying forces. On the other hand, it is difficult to see how the former facilities can be restored in less than ten years. Dental education in Germany was hampered by political interference with universities long before the war, and the damage done during the war only served to accentuate the decline of German dentistry which probably began with World War I and its aftermath. At this time there is great respect for American dentistry in Germany, and the desire is often expressed that an interchange of dental educators might take place when such a move becomes practical.

2. Interviews with Officials of German Dental Schools

Prof. Dr. Elsbeth von Schnitzer, Professor of Orthodontics, Heidelberg University.—Dr. von Schnitzer has under treatment about three hundred orthodontic cases in her private practice and in the University clinic. She is using a method introduced about two years before the war by Dr. Andreson of Den-

mark and developed by Dr. Leopold Petrik of Vienna.

Briefly, the Andreson technic consists of two phases. The first phase comprises the widening of the arches if necessary and the gross movement of individual or groups of teeth by an expansion splint placed on the lingual area and worn only at night. After this first phase is completed, in a year or less, the second phase of treatment begins. This phase is the slow development of harmony in occlusion and jaw relations by means of a splint loosely fitting both upper and lower teeth and worn only at night. This phase may last two years and requires few adjustments. This splint is ground so that it acts only as a large guide plane for all teeth, channeling them to the final correct position. It does not exert positive pressure at any time and the teeth grow to their new relations rather than move under compulsion. The splint is worn only at night and is so loose that at first it tends to fall out. It results also in considerable bite opening if desired. This reporter is not an orthodontist, but results shown on casts appeared good and the occlusion between individual teeth seemed better than normally expected. While this method requires a somewhat longer period of treatment, the total cost is reduced by the infrequency and simplicity of adjustment. Some patients not seen for four months owing to the confusion of war progressed normally during that time. The fact that only removable appliances, worn at night, were used appealed to the patients. Cost per case varied from 500 *marks* to 1,500 *marks*. It is difficult to translate this sum in terms of American exchange as the *mark* has not had a free market for some years. At present rates, this fee would be from $50 to $150. At the old rate of about 4 *marks* to the dollar, the sum would be from $125 to $375. This is probably a fairly accurate translation in terms of buying power.

There is a shortage of trained orthodontists in Germany. Dr. von Schnitzer was the only one in Heidelberg, Mannheim and Ludwigshafen and had patients from Strasbourg and Saarbrücken. In an effort to increase the number of practicing orthodontists, the German government sponsored in 1940 a plan whereby Heidelberg and seven other schools gave courses to practicing dentists. These courses were planned for two weeks every six months for three years, for a total of twelve weeks. The dentist was expected to treat orthodontic cases in his own practice during this three-year period and could bring casts of his practical cases for guidance and advice. Because of the war, these courses were discontinued before they could be completed. Completion of the course was to qualify the dentist for registration as a *Fachzahnarzt für Kieferorthopädie*, or specialist in orthodontics. It was not planned, however, to limit these men to the practice of orthodontics as had previously been the case with specialists of all classes. Previous requirements had been three years as assistant in a clinic treating orthodontic cases.

Three books have been published on the Andreson technic.

These are:

"Funktionskieferorthopaedie," III Auflage, by Andreson and Haupl, published by Johann A. Barth in Leipzig, 1942.

"Gebissregelung mit Platten" by A. Martin Schwarz, published by Urban u. Schwarzenburg, Berlin and Vienna, 1944.

"Lehrgang der Gebissregelung, V. Teil, Die entwicklungsbezügliche Bestimmung der entwicklungsbezügliche Befund" by A. Martin Schwarz, published by Urban u. Schwarzenburg, Berlin and Vienna, 1944.

The method has also been applied to bite opening for prosthetic cases as reported by Richard Grohs and Leopold Petrik in "Zeitschrift für Stomatologie," April 1944.

Dr. Bernhard Kramer, Head of the Dental Society (KZVD) of Heidelberg.—Dr. Kramer is head of the local dental society at Heidelberg in an informal capacity, as the society is actually a part of the Mannheim group and its headquarters are in that city. Dr. Kramer is in general practice and is not connected with the University. He may be regarded as an average German dentist, maintaining a good practice consisting partly of insurance practice and partly of private patients. His opinions are not necessarily representative of the most advanced German dental science, but represent German dentistry as actually practiced.

In Heidelberg, the *Zahnärzte* (degree dentists) outnumber the *Dentisten* (non-degree dentists) by two to one and Dr. Kramer believes that the two groups will eventually merge into one class, with common educational requirements. Such a move was under way in 1935 but was not encouraged by the Nazi party.

Dr. Kramer believes that caries is the result of poor diet and poor oral hygiene. He thinks these two factors are of about equal importance. He does not have much confidence in the ability to control caries by diet and hygiene, however, indicating some other unknown factor.

Focal infection from teeth is believed to cause "heart disease, kidney disease, rheumatism and nerve diseases." Dr. Kramer practices a simple root-canal technic without rubber dam or bacteriologic check, sealing in antiseptic (chlorphenol) for two treatments and filling the canals with gutta-percha. He is not sure of the result from the health standpoint.

Sulfa drugs are used internally in cases of developed infection but are not used prophylactically or locally.

Periodontoclasia is believed due to the "inner constitution" of the patients, old age or lack of adequate diet, especially lack of vitamin C. Treatment of moderate cases is by prophylaxis and relief of traumatic occlusion. Late cases are treated by gingivectomy. Patients are given a paste called "Cebion" which contains vitamin C and is massaged into the gums twice daily.

Dr. Kramer thinks that the acrylic resins are good for denture bases but are not sufficiently tested for crown and inlay work. He has not heard of the use of acrylic resin and liquid for direct insertion in cavities followed by polymerization by the use of the infra-red lamp.

He routinely uses steel for crowns and prosthetic work. He uses palladium alloys, when available, for inlays, but would prefer gold.

Preventive dentistry has been carried on by semiannual examinations of school children, followed by treatment by the school dentist, and by instruction in home care. Before the war, poorer children in Heidelberg were given an accessory "ration" by an American Quaker organization. This ration contained vitamins C and D and was believed to help dental health.

Dr. Kramer thinks that the state insurance system is good for the patient but that it does not give the dentist much incentive to improve his technic by postgraduate study, as fees remain the same for good or poor work and most dentists are busy throughout the working day. The natural result is a desire to get out more work by seeing as many patients as possible in a given time. The system does provide for every citizen at least minimal dentistry. Through its control of licenses, it also insures that smaller towns will have adequate dental care.

The state dental system provides replacements only if less than five teeth remain above and below in occlusion (total of at least ten occluding teeth).

Mr. Neumann, Karlsruhe.—Mr. Neumann is currently directing the school for *Dentisten* (non-degree dentists) in Karlsruhe, in the absence of Mr. Emil

Kimmich who has moved to Baden-Baden, pending opening of the school.

There are seven schools for *Dentisten* in Germany: at Berlin, Dresden, Düsseldorf, Frankfort, Karlsruhe, Munich and Vienna. They graduated about 550 students yearly before the war. During the war they were closed except for their operating clinics. Their graduates were not commissioned in the Army. There are said to be about 20,000 *Dentisten* in Germany but this figure is believed by the reporter to be too high. Exact figures are unavailable outside of Berlin, if there.

The school at Karlsruhe was said to be the largest in Germany, with about 130 students. Only 5 per cent were women, as women did not like the required preliminary qualification as laboratory technicians.

Only one year was spent in the school for *Dentisten,* but seven years were required for qualification after completion of elementary school, as follows:

Three years as apprentice in a commercial laboratory, with one day weekly spent in a special apprentice school.

Two years in the office of a practicing *Dentist* (non-degree).

One year in the institute for *Dentisten.* In this year four hours were spent in class work daily and five hours in the clinic. Studies included physics, chemistry, anatomy (general and special), surgery, roentgenography, operative procedures and prosthetic technic.

One year in the office of a practicing dentist.

During his apprenticeship in the laboratory, the student received no pay. During his first two years in a dental office, he got a small salary. While in the institute, he paid the school a small fee. After graduation he again received a small salary while working with a licensed dentist. Each stage of his study was followed by a state-controlled examination.

The school itself is privately owned. Only the examinations are state-controlled.

Mr. Neumann estimates that the ratio of *Dentisten* to *Zahnärzte* in Germany is 2 to 5. This ratio agrees roughly with those suggested from other sources.

The licensed graduate could legally perform all dental operations except (a) intravenous therapy, (b) general anesthesia and (c) major oral surgery.

Prof. Dr. Peter P. Krantz, Munich.—Dr. Krantz, who has a medical and dental degree, is director of the dental school of the University of Munich, a position he has occupied since 1929. He is also professor of oral surgery. Other full professors are Dr. Carl Falck (prosthetics), Frau Dr. Kostes (ceramics) and Dr. Carl Piepe (operative dentistry and periodontology). Dr. Piepe is in custody as a Nazi. Other members of the staff are available.

The medical school of the university is 50 per cent destroyed. The dental school is 100 per cent destroyed and at present is operating only a small clinic in temporary quarters. Before the war, this school was second in size only to the one in Berlin.

The dental school had a maximum enrollment in 1923 of 780 students. This number dropped gradually to about 250 at the beginning of the war. The cause of this drop has been discussed in other reports. The positions open for dentists had decreased considerably by 1938. Of 250 students in 1938, 40 per cent were women and 20 per cent were foreign students, chiefly from the Balkans. It was not known how many dentists graduated yearly during the war.

In 1940, Dr. Krantz was taken into the military service and served until April 1944, most of the time as chief of the maxillofacial service of a Luftwaffe hospital in Paris. Enrollment in the school dropped immediately after the start of hostilities to a total of about 60

students, of whom 60 per cent were women, 20 per cent foreign students, 10 per cent disqualified men and 10 per cent military personnel in student companies.

Dr. Krantz believes that the trend toward more women in dentistry will continue. He believes that the fee scale in socialized dentistry did not have much effect on enrollment, but that difficulty in getting a place to practice after graduation was a limiting factor. A dentist could participate in insurance practice only if an opening was certified by local authorities.

Dr. Krantz is pessimistic about dental education in Germany, past and future. He says students came from the *Gymnasium* (high school) poorly prepared, owing in part to time lost to parades and political activity. He believes that a four-year course is sufficient for general practice if the time is well used. He believes that an internship is essential for specialists. In this school, oral surgeons took one year of additional schooling and then spent two years as assistant in the clinic. This was the system followed at Vienna also. Dr. Krantz says that the general practice in Germany is to require three years in a hospital or clinic treating jaw cases, after which a certificate from the clinic will authorize registration as a specialist without special examination. This statement is not in accord with that of the director of the dental school of Jena, but was emphatically stated to be correct. This question will be investigated further.

Operative requirements in the clinic years of the dental school in Munich, which were set by the professor in charge, were as follows for the first year:

4 bridges
12 full or partial dentures
13 amalgam fillings
9 amalgam fillings rebuilding crown of tooth
9 silicate fillings
9 cement fillings
28 root-canal fillings
11 inlays
5 gold foil fillings (if patients could be obtained)
13 prophylaxes

During the second clinic year, the student worked on cases as they were assigned or as he individually preferred, except that no prosthetics work was done after the first year unless by the student's special preference.

The Nazi regime did not interfere with operation of the school. Only once did a party representative interview members of the staff. Dr. Piepe was said to be a strong party man and not a good scientist.

The school was most noted for its oral surgery department, which attracted many students from the Balkans.

Caries prevention was based on improved diet and hygiene. Dr. Krantz believes that diet of the pregnant woman is most important since the child's first molar is formed before birth. He believes that hygiene is more important than diet and that there is also a hereditary factor of unassessed importance. He believes that the diet of the past twelve years has not been wholly adequate.

Dr. Krantz states that there existed in Germany a dental research council which acted as a clearing house for information but which did not itself finance or direct investigations. Yearly meetings were held but only to discuss in a general way one specific problem each year. The last meeting was held in 1939. There were no standing committees. Chief researchers in caries were Dr. Euler of Breslau, Dr. Schroeder of Berlin (deceased), Dr. Graz of Vienna and Dr. Mathis (last location unknown). The investigation of these men apparently followed the lines of investigation most common in the United States regarding the effect of diet. Their work has been reported in the literature, files of which are being forwarded to the Army Medical Library.

There was in Germany no council for passing on the merits of products that were offered for sale to the dental profession.

At present, maxillofacial cases in Munich are treated at the *Ober-fohring Luftwaffe* hospital. There are at present only ten cases under treatment. Air raids did not result in many maxillofacial cases, probably because of the nature of the injuring force. Persons were subject to crushing injuries over large areas of the body, but seldom to injuries from high velocity missiles.

Very new and favorable cases of facial wounds were treated with immediate closure without drainage. More often immediate closure was done with rubber dam drains. Unfavorable cases, either because of elapsed time or severe tissue destruction, were left open until danger of infection was past (ten or more days).

Bone grafts of the jaw were usually taken from the crest of the ilium. Ribs were not used. These grafts were usually taken as free grafts without previously embedding them in the tissue of the abdomen. The bed for the graft is prepared up to fourteen days before the graft is to be placed. The bed is left open with a drain in place. It is claimed that this procedure reduces bleeding at the time of operation and makes a cleaner field, and that granulation of the exposed bone ends in the bed promotes rapid union and reduces infection. Dr. Krantz claims that Dr. Ertl of Budapest is the proponent of this method. He claims good results in his own experience.

Simple jaw fractures are usually treated with splints of acrylic resin. Simple fractures in the midline are usually immobilized only with bandages. Intermaxillary wiring is used infrequently. When used, it is applied with rigid immobilization for two weeks, after which only "semi-immobilization" is kept up, for another two weeks. Direct fixation with plates or pins is not practiced. Circumferential wiring of edentulous cases is occasionally, but rarely, used.

Sulfa drugs are used prophylactically in severe cases, especially where bone is exposed.

Novocaine is used routinely for local anesthesia. Pontocaine has been used but no advantage is seen in its use.

Periodontoclasia is treated by early gingivectomy. Advanced cases are not believed curable. Gingivectomy is considered as the conservative treatment, not as a last resort for severe cases.

Dr. Krantz mentioned an operation for correction of labially prominent anterior teeth in adults. He stated that this operation was common and had been practiced in Germany for many years. If all six anterior teeth are to be moved back, vertical cuts are made in the mucous membrane vertically between the cuspids and first bicuspids on the labial surface. The labial gingivae are reflected to a level above the apices of the upper anterior teeth and the segment of bone holding the teeth is loosened by cutting with a chisel or bur between the cuspids and horizontally over the apices of the teeth. This block of bone is then pushed back to the desired position and immobilized with a labial arch wire. The lower teeth are prevented from striking the upper teeth by insertion of a splint over the lower posterior teeth, which is left until reattachment takes place, about a month. It is claimed that devitalization of the teeth does not occur and that results are good. Individual teeth or two or three teeth are moved if required. When moving individual teeth, vertical cuts are made on the labial surface between the tooth to be moved and the adjoining teeth. In addition, the tissue lingual to the tooth is reflected upward from the bone and sufficient bone is removed with a bur to make it possible to push the tooth back the required distance. This method is practiced only when orthodontic treatment is not considered feasible. It is to

be understood that the reporter is merely describing this method and does not indorse or condemn it. Sectioning of the neck of the condyle of the ramus is also practiced for those cases in which repositioning of the mandible is required, following procedures known in the United States.

Osteomyelitis is treated with x-ray dosages of 150 to 200 R given eight or ten times at intervals of forty-eight hours. This treatment is said to give rapid relief of pain, with decreased healing time. Data on KVP and filtering were not known to Dr. Krantz.

Dr. Krantz believes that there is increasing awareness of the dangers of focal infection among German dentists. He says that he is also becoming convinced of the impossibility of sterilizing and keeping sterile the root canals of multirooted teeth. He believes that extraction of dead teeth is safest. He thinks that it will be some time, however, before German dentists will adopt a more careful attitude in selecting teeth for treatment, partly because of past training and partly because of pressure from patients. At present, treatment is attempted for almost any type of case, frequently by pulp amputation without further treatment of the canals, beyond sealing in a mummifying agent.

The provocation method of diagnosing focal infection in a suspected tooth by means of diathermy or vibration is practiced and taught, but is not considered more than an indication of the condition of the tooth and is not relied upon.

Dr. Krantz thinks that the public insurance program in Germany has not worked out well, though he does not seem to base his reaction on definite facts. He says vaguely that it is too big and has too much overhead. More concretely, the fees are too low to encourage good work, the dentist and patient are encouraged to conspire to defraud the system by reporting work not actually done and the dentist tries to sell the patient work not paid for by the insurance system to get a larger margin of profit. Dr. Krantz favors a system of private practice for average patients, with university or charity clinics for those unable to pay a reasonable fee. (It seems generally accepted by most German dentists, however, that the insurance scale of fees, low as it is, represents about the maximum that average Germans can, or will, pay.)

Prof. Dr. Ottomar Jonas, Freiburg.—Dr. Jonas was in Leipzig until 1936, when he came to the University of Freiburg. He practiced oral surgery, prosthetics and orthodontics. He was a professor at Freiburg (prosthetics) until the end of the war, when Prof. Dr. Fritz Farber was relieved because of his Nazi activities, and Dr. Jonas became acting director. Dr. Emig was instructor in operative dentistry.

Freiburg had one of the larger dental schools in Germany. Its students numbered about 500 until the war, without the drop noted after 1934 in most schools. Dr. Jonas says that he brought many students here from Leipzig in 1936, at the time that the decrease in most schools was most evident. This sounds improbable but there seems to be no other explanation and is borne out by the fact that the school at Leipzig dropped more rapidly (75 per cent) than most schools in this period.

During the war, Freiburg maintained a student body of about 150, 80 per cent of whom were women and the remainder military and disqualified men. During the war, three semesters of work were given each year so that a student could graduate in a little over two years. More than half took an extra semester to get the doctor's degree.

Students at Freiburg put in two semesters only in clinical prosthetic work. During this time they completed a total of eighteen pieces (bridges and full or partial dentures). Dr. Jonas did not know

how much operative dentistry was required.

In Freiburg there are about thirty degree dentists and about twenty *Dentisten* or mechanical dentists. During the war, only ten dentists were taken from Freiburg and there was no difficulty in getting dental care until the town was badly damaged in November 1944. Gold and acrylic resins were scarce but there was no shortage of alloy or rubber. This contradicts newspaper reports in the United States that only most urgent emergency work was authorized and that alloy for amalgam was very scarce. (One small firm in Pforzheim claimed that the French confiscated about a ton of silver from their factory alone.)

The dental school was completely destroyed in November 1944.

Dr. Jonas believes that the state insurance system is better than private practice, at least for the patients. He believes that the low fees force rapid work, however, and he favors the operation of clinics on a salary basis. He cites the example of the fee for a root-canal filling, which brings twenty-five cents at present exchange rates or about sixty cents at old exchange rates. A root-canal file alone costs about one-third of this sum. Berlin, Breslau, Hamburg and other larger cities operated such insurance clinics on a salary basis, but most work was done on a fee basis.

Preventive dentistry was based on hygiene and diet. The latter emphasized principally vitamins C and D. No evidence was given that vitamin C affected caries, but vitamin C was apparently given with the idea that it might help anyway.

Vitamin C was also given for periodontoclasia, but chief reliance was placed on a forcible spray using oxygen as the compressed gas. The solution used was thought unimportant. It is said to contain a silver solution, but it is not clear just what form of silver was used.

Only procaine was used for local anesthesia. The standard acrylics were used for denture and bridge work. Acrylic resins were not polymerized within the cavity. "Vitonlak," an I.G.F. product (made up into solution at Pforzheim, Heimerle u. Neule), was used instead of tin foil for vulcanization. This product was said to be satisfactory.

Dr. Karl Falck, University of Munich.—Dr. Falck is professor of prosthetics in the University of Munich. He was questioned particularly regarding the substitutes for gold used in Germany during the war.

At first the shortage of gold was met by alloying with increasing ratios of silver and palladium. These alloys were generally satisfactory but gold early became unobtainable. At this time the palladium-silver alloys came into use, a sample formula for which was:

Palladium, 25 per cent
Silver, 65 per cent
Gold, 2 per cent
Base metals, largely copper, 8 per cent
(Information from manufacturer indicated that the percentage of gold ran nearer 10)

This material was marketed as "Palliag," "Alba" or "Econor," made, respectively, in Frankfurt, Hanau and Pforzheim. These alloys were widely used and were considered satisfactory. They were used for inlays or in sheet form for denture bases. They were not used for cast clasps. The metal was said not to blacken in the mouth and could be soldered.

Later palladium (obtained from Canada) became scarce and other alloys came into use. One of these ("Silca") contained:

Silver, 82 per cent
Tin, 15 per cent
Copper, 3 per cent

This metal discolors badly, has sufficient edge strength and cannot be soldered satisfactorily as the solder line breaks down in the mouth. It was used for inlays, crowns and pontics.

Other alloys of aluminum, tin or zinc and silver were used but were brittle and unstable (Deufa metal).

The most common materials in use at the end of the war were the stainless steels. These steels had adequate strength and held up well in the mouth but were difficult to fabricate and in the cast form were not accurate enough for inlays or three-quarter crowns. Among the stainless steels were:

Wipla or Krupp V_2A
- Fe, 74 per cent
- Cr, 18 per cent
- Ni, 8 per cent (for swaging or in wire form only)

BH_3 (made in Vienna, name of company not known)
- Fe, 72 per cent
- Cr, 20 per cent
- Ni, 8 per cent

Vitallium

Pontica-muzit (a complicated formula of Cr, Ni, Cu and Fe, made by Rochling in Ruhr)

These metals required hydrogen, or acetylene and oxygen, or the electric arc, for casting. The electric arc was considered best for those containing iron to prevent the separation of carbon crystals under prolonged heating and also to prevent the absorption of hydrogen. None of these metals cast accurately enough for inlay work and all required a special investment, flux and solder. The steels were usually cast in an investment of Al_2O_3 and phosphoric acid. Krupp's was called "Pyrofen." An investment for both steel and vitallium was "Neo-kredolite," made in Breslau.

Dr. Falck states that models for acrylic work are painted with a 30 per cent solution of calcium chloride as the only protective medium during curing. This solution is painted with a brush onto the hot, dry cast after boiling out the wax. It is applied and allowed to absorb about three times. The theory of its use is that the affinity of $CaCl_2$ for water is such that no vapor exists inside the flask. It also raises the boiling point of water to a degree that steam is not formed inside the flask. This method is reported for testing if desired. The reporter can only state that good results were claimed for it.

Full denture technics are sketchy. Impressions are usually taken in plaster in a stock tray, though occasionally a preliminary tray is made and the impression completed in compound so that muscle trimming can be done. The denture space is determined by closing the mouth until the lips touch lightly.

Centric relation is determined by having the patient swallow and close the mouth or by having the patient hold the tongue well back when closing the mouth. The Gysi tracing is not used. Plain line articulators are almost universal. Dr. Falck states that most students learn very little about prosthetics while in school, and, in view of the fact that they were required to make only six full or partial dentures, this opinion seems well-founded.

Dr. Josef Kohler, Heidelberg.—Dr. Kohler is principal dentist in the dental school of the University of Heidelberg, though without official position. The former director was Prof. Dr. Karl Schmidhuber, now under arrest as a member of the SS. The present acting director is the chief of the ear, nose and throat department and is not a dentist. Others prominent in the dental faculty were:

Dr. Alexander Ritzert, assistant in oral surgery, under arrest as an SS member.

Dr. Fritz Kullman, assistant in charge of prosthetics, now a prisoner of war.

Prof. Dr. Elsbeth von Schnitzer, professor of orthodontics.

Dr. Weissenfels, assistant in surgery till 1936, now an oral surgeon in the city giving one hour of lecture time weekly.

Enrollment figures were not available, but, in the years immediately before the war, the number of students averaged

about a hundred. With the outbreak of war, the number of students dropped, at once, to thirty to forty, of whom twenty to twenty-five were women, five were military students and the rest were physically disqualified men. The number of students that could be accepted annually was fixed by the government beginning with 1937. No courses were given for dental officers in the Army.

Very little damage was inflicted on buildings, but many staff members left the school during and after the war. The course of study was not much affected by the war until 1945.

As in other schools, the required course for a degree was three and one-half years. Most students attended for an additional half year to take the degree of "Doctor" in addition to the required title of *Zahnarzt*. Dr. Kohler believes that students should have three or four months of practical experience under a practicing dentist after graduation. He believes that a system of internship or a requirement that all students have a degree in medicine would be even better.

Before the war, semesters were short (three to three and one-half months) so that students had nearly five months free out of the year. Some worked in the clinic in this free time; others went to their homes. During the war, three semesters were crowded into each year so that the seven semesters required only two and one-half years.

Clinical requirements for students were as follows:

First Semester
- 15 amalgam fillings
- 10 cement or silicate fillings
- 6 inlays
- 5 prophylaxes
- 10 root-canal fillings
- 3 full dentures
- 4 denture repairs

Second and Third Semesters (Combined)
- 20 amalgam fillings
- 20 cement or silicate fillings
- 15 root-canal fillings
- 20 inlays
- 7 prophylaxes
- 1 apicoectomy
- Extractions as available

Prosthetics work could be done during the third semester if desired and if time was available. Considerable time was left in the third semester for study for final examinations.

Very little research work was done in the Heidelberg University dental school for some years before the war.

Preventive dentistry was based on early treatment and diet. A proprietary product of Merck called "Calcipot D.," containing calcium phosphate and vitamins C and D, was given to private patients but with uncertain results. A student claimed to have established the existence of circulation in the enamel by sealing a solution of fuchsin in a root canal of a devitalized tooth in situ. After three days, the tooth was extracted and sectioned, and it was claimed that the dye had penetrated through the full thickness of both dentin and enamel. Details of this work are lacking and it was not published.

Periodontoclasia was treated early with relief of traumatic occlusion and prophylaxes, followed by the use of an iodoform or sulfonamide paste (or orthoform) in the pockets. More severe cases were treated by gingivectomy.

Procaine and suprarenin or cobefrin were used for local anesthesia. Pontocaine was used for topical anesthesia but was considered too toxic for injection. No other anesthetics were experimented with.

Chemotherapy: The common sulfa drugs were used prophylactically in severe bone injuries, both internally and by dusting in the wound. A proprietary product of Knoll AG, Ludwigshafen, called "Salthion," was being experimented with and was thought to be very effective against the same organisms as are affected by sulfathiazole. The material is used only locally as a solution on

gauze packs. No work had been done on the benzyl derivatives developed by the Kaiser Wilhelm Institute in Heidelberg.

Dr. Kullman had worked with acrylic eyes but the results were not known to the dental staff.

Fractures are treated routinely with acrylic splints. Intermaxillary wiring, direct bone plating or external fixation with pins are not used, though the head-cap is used when indicated. Bone grafts were formerly made from the crest of the ilium, from the tibia (osteoperiosteal) or from a rib. Now only the ilium is used, with fixation by steel wire. Wire is removed in eight weeks.

Dr. Kohler mentioned that both Swiss and French dentists have acrylic materials for direct filling of cavities, but details are not known. He has heard of the hollow bur cooled by CO_2 but he does not know by whom it was developed and he has never seen one.

Dr. Werner Rössle, University of Erlangen.—Dr. Rössle is an assistant in surgery in the dental school. Prof. Dr. Edwin Hauberisser was director of the dental school and has been arrested for Nazi activities. Dr. Heinz Paschke is acting director but was not available at the time of interview. Dr. Otto Winkelmeier is professor of surgery and Dr. Rössle is acting head of the surgical department.

The dental school was not damaged by air raids but classes were interfered with considerably during 1944 and 1945 by air raid alerts.

This was one of the smaller schools in Germany. It had a maximum of about 160 students in 1932-1933, dropping off gradually to about eighty students when the present war began. During this war, the number of students dropped to about twenty women and disqualified men, plus a variable but small number of military persons. About 75 per cent of the students were women. Students from Rostock and Cologne were taken in temporarily pending repairs to schools there.

No research was carried on at Erlangen during or for some years before the war.

Dr. Rössle believes that the dental insurance system pays fees so low as to discourage good work. Otherwise he approves of it.

During the war, there were no restrictions on dental practice in Erlangen except those due to shortages of gold and rubber.

3. Dental Education and Practice

This section is based on an investigation of the dental school of the University of Marburg. Prof. Dr. Hans Heuser, assistant director, is now in charge of the dental school in the absence of Prof. Dr. Fliege who is being held because of his Nazi activities. Dr. Heuser was professor of operative dentistry. Dr. Fliege was professor of surgery and a Prof. Kunzendorf taught prosthetics. The school was not a large one, varying from 200 students in 1934 to about 100 in 1938, a number maintained through the war. The school is undamaged and could function at once if permission were granted.

Enrollment was at a maximum from 1922 to 1934, falling off nearly 50 per cent after that date. This has been found to be the case with most schools in Germany. The cause is said to be that men whose schooling had been interrupted during World War I were anxious to complete it afterwards and there were not enough dentists in Germany at that time. By 1934, there were fewer openings in the socialized dentistry system and new graduates could seldom count on making a living in private practice alone. It is not felt that low fees in the socialized dental system were primarily to blame as these fees were in effect at the time of greatest enrollment.

After 1934, women made up at least 40

per cent of the students at this school and made up 50 per cent of the student body at the outbreak of World War II. At the outbreak of hostilities, all physically qualified men were taken from school, leaving about fifty women and a very few physically disqualified men. In 1940, the dental school in Frankfurt was damaged and all students went to Marburg for the winter semester only, returning to Frankfurt for the summer semester of 1941. From 1941 to 1943, the school averaged about fifty students, mainly women. From 1943 to 1945, the enrollment was increased to about 90 or 100 by the addition of some forty to fifty men, one-third of whom were from the *Wehrmacht* and two-thirds of whom were disabled veterans. Women still remained in the majority. Women appear to like dentistry and do well in school clinics. Dr. Heuser thinks men do better in general practice.

The course of study was similar to that in all other schools in Germany and required three and one-half years for graduation, with an extra half year if the degree of doctor was desired. Most students here completed four years. (See the report on dental education for the details of the course.) Dr. Heuser felt that the war had not interfered greatly with instruction at Marburg. Military students devoted one afternoon weekly to military duties. The Nazi regime had not interfered with the operation of the school, although Dr. Heuser said that Dr. Fliege would probably not have been made director if he had not been active politically. The director of the dental school of the University of Giessen was said to have been appointed in 1942 largely for political reasons. After 1934, no Jewish students were enrolled, as was the case throughout Germany.

No qualified students were refused enrollment, but lack of opportunity after graduation kept the total low.

Dr. Heuser believes that the three and one-half year course is too short and recommends at least one more year, with increased time to devote to general medical background.

Dental Research

Very little important research appears to have been carried on at this school before or during the war. Dr. Fliege did some work on conservation of teeth with fractured roots and also on the local effect of anesthetics on tissues. Dr. Heuser did work on the relation of the floor of the maxillary sinus to the roots of the teeth.

Dr. Heuser mentioned the existence of a group for caries research, formed about 1934. To date, no definite results have been achieved so far as Dr. Heuser knew. Dr. Euler of Breslau was the most important member. Dr. Euler's work consisted primarily of studies of skeletons from various periods in German history. From these studies, he concluded that the introduction of highly refined foods from France in the 1600's was followed by an increase in caries. He also concluded that those people eating simpler food (Poles and Prussians) had better teeth. Dr. Euler was thought to have done work on nutrition in relation to caries, but results were not known to Dr. Heuser. Prof. Goeth, also of Breslau, was Dr. Euler's assistant.

Preventive dentistry, as taught at Marburg, was based on personal oral hygiene and early treatment. Calcium salts were recommended, as were vitamins C and D, but not too much was expected from their use.

Dr. Heuser, whose primary interest is in roentgenography, made a study of periodontoclasia in which he came to the not very startling conclusion that there are three types of factors involved: (1) local factors (calculus), (2) traumatic occlusion and (3) systemic factors (endocrine deficiencies).

What part each played and the differ-

ential diagnosis in any given case was not determined, though Dr. Heuser believed that in almost all cases a systemic factor was present. This conclusion was based on roentgenographic observation of moderate pockets in mouths without symptomatic periodontoclasia. In spite of the belief in a systemic background, treatment was largely local (scaling, equalization of occlusion, gingivectomy in advanced cases).

Miscellaneous

Acrylic resins are used for bridges and for inlays and crowns for front teeth, but they are not used for posterior fillings.

The "provocation" method of irritating a suspected tooth by diathermy or vibration in the hope that it will reveal itself as a source of infection by (1) developing an acute abscess or (2) causing an acute exacerbation of a systemic disease is practiced but with misgivings. Blood sedimentation tests in cases with suspected foci are sometimes called for by other clinics, but are not considered reliable by the dental department. The diseases believed due to focal infection are about as taught in the United States, except that emphasis is placed on rheumatism and endocarditis, the cause for the latter disease being usually considered not proven in the United States. Dr. Hohlfelder of Frankfurt and Giessen claims to sterilize and break up granulomata with x-ray treatment (as previously reported by Dr. Klughardt of Jena). The method proved unsuccessful when tried at Marburg.

Military Dentistry

The subject of German military dentistry was investigated at a prisoner-of-war hospital located at Marburg. This hospital, under control of the 10th prisoner-of-war hospital at Marburg, treats German military patients. It is not a maxillofacial center, though some work of this nature is done by Oberfeldarzt (Z) Gottlob Alfken, dental officer. Bone grafting is referred to Prof. Dr. Wiedhopf, of the Philips University.

When first seen, Dr. Alfken was preparing to do an apicoectomy. Doctor and nurses scrubbed carefully, though no gloves or masks were used. The patient was draped and the instruments were handled under aseptic conditions. The field was dried and iodine was applied, but débris was washed out with saline solution and the patient was allowed to spit frequently. The field was also irrigated with "perhydrit" solution of hydrogen peroxide derived from tablets dissolved in water which seemed to liberate oxygen freely. In all other respects, a standard operation was performed.

At a later appointment, Dr. Alfken was interviewed at length, in the presence of the German commander of the hospital. For convenience, his remarks will be reported under general subject headings.

Army Dental Corps.—Before the war, there was no dental corps in the German Army. It was reasoned that in a short blitzkrieg no dentists would be needed. Prominent dentists tried to have a dental corps authorized, but without success. There was also no dental corps reserve, and no definite plan for including a dental corps in the regular Army after the war, although such a plan was discussed and advocated. Medical officers for the *Wehrmacht* were educated at government expense at the Military Medical Academy in Berlin, but no dentists were so educated.

Soon after mobilization in 1939, dentists already in the *Wehrmacht* as line troops, or entering later, were given a noncommissioned rating (*Kriegszahnarzt*) somewhat similar to that of contract surgeon. They wore the uniform of officers and were given the relative rank and pay of major or lieutenant colonel, depending on age and profes-

sional standing. In this situation, they were not part of the *Sanitäts Korps* and functioned directly under the *Sanitäts Inspektor* of the *Wehrmacht* in professional matters and under local commanding officers for administration.

Early in 1943, dentists were made part of the *Sanitäts Korps* and were simultaneously reduced in grade to that held before creation of the *Kriegszahnarzt* grade. As many of them had been privates or noncommissioned officers in line units, they reverted to these grades. New graduates from the schools also entered the Army thereafter as privates in line units. These dentists in the grade of private were given the grade of *Unteroffizier* in about eight weeks. They were then ineligible for further promotion until they had served at least six months at the front, when they could be promoted to *Unterarzt* or third lieutenant. New dentists entering the Army went through all noncommissioned grades, though more rapidly than line troops. After arriving at commissioned grade, the dentist could reach the grade of colonel. Promotion was based principally on seniority, though exceptions were made to promote outstanding men ahead of their relative positions. Such promotions were handled by a central office (military personnel) of the *Wehrmacht* and were made to fill vacancies. Promotions were based on vacancies in the Army as a whole and not in the officer's own organization. Thus the officer might be promoted while holding a minor position in his own unit. Men generally were shifted sooner or later, however, so that important positions were held by higher grades. (Other dental officers interviewed did not feel that seniority was very closely adhered to in making promotions. All agreed that promotion could be made out of turn, some believing that the system closely approached the so-called "merit system.") Promotion in the lower grades was fairly rapid, occurring at intervals of six months to a year. In higher grades, it was slower, occurring at intervals of one to two years. (These figures are obviously estimates, just as no exact answer could be given to the question: "How long does it take to go from captain to major in the American Army?") Toward the end of the war, the requirement that a dentist have battlefront service before commissioning was relaxed.

Selected enlisted men from line units, who were usually former dental students, were returned to dental schools after six months in line service. They were given noncommissioned grades and received pay and allowances, but school expenses were paid by the student.

It was stated by both the dentist and the physician present that no dentists were assigned to line units in the German Army, but always were assigned to hospitals. This information does not agree with that from other sources and is not believed reliable.

Dentisten (dental technicians) were not taken into the Army dental corps, but in some cases obtained equipment and operated informally for their own troops. Some worked as laboratory men in hospitals in noncommissioned grades.

Dentists were expected to help physicians in case of grave emergency, but such use was rare and dentists generally did only dental work. They did not do nonprofessional duties.

Replacement of teeth was authorized for any tooth lost in combat or as a result of duties as a soldier. Officers and noncommissioned officers received replacements necessary to speech. Others were supposed to receive replacements when less than four contacting teeth remained above and below. They were also to receive replacements if all anterior teeth or all posterior teeth were missing, but this was often impossible and it was stated that no attempt was made to replace teeth for "peasants" who the

dentist believed would not wear an appliance even if supplied with one.

The teeth of all troops were examined once yearly with a mirror. Cavities and other required work were listed on a chart which was returned to the battalion surgeon. Patients were sent in by the battalion surgeon when occasion offered. (This provision would seem to apply to hospital practice only.) A monthly report was rendered on the amount of work done, but no report of the condition of the command was made except optionally under "Remarks."

Patients could not refuse treatment of conditions which affected their military efficiency.

The persons interrogated could not estimate the number of fillings placed per dentist beyond saying *"viele hunderd"* (many hundred) per month.

No central dental laboratories were available, all prosthetic work being accomplished at hospitals. Nothing was known of any mobile laboratories. There were many mobile operating trucks, but they were used only in Russia. (One such truck has been previously reported in Pilsen, Czechoslovakia.)

Maxillofacial Surgery.—Maxillofacial cases received air evacuation with high priority. Special hospitals were established in Russia for the big offensives. First aid bandages were applied in the field. Wire arch bands were applied in *Feldlazaretts* (field hospitals); splinting was usually done at maxillofacial hospitals.

Immediate closure of facial wounds was practiced if cases were new (twenty-four hours). If older or badly contaminated, they were left open for several days. Drains of rubber dam, either through-and-through or at one end of the wound, were always used on closure, whether old or new. A rubber dam drain which tended to remain in the wound was made by cutting a one-quarter inch hole, three-fourths inch from one end of a strip of dam three-fourths inch by two and one-half inches. The short end was then doubled back through the hole, making a constriction there with a flare out toward the short end.

Sulfa drugs were always used locally as a light dusting, and were used internally only in cases of developed infection. Two to 4 gm. was given as a start, with 1 gm. every four hours day and night for three or four days. In case of severe infection, sulfa drugs were given intravenously or intramuscularly. Tetanus antitoxin was given routinely at the beginning of treatment. Both grafts from the ilium and osteoperiosteal grafts from the tibia were used. Setting of maxillary fractures was done by dentists, bone grafts by surgeons and plastic procedures by either.

Débridement was either conservative or radical. Radical débridement was used if the wound was badly contaminated or old.

Fractures were occasionally treated by wiring, but generally by acrylic splints, usually without fixation to the upper jaw in case of mandibular fractures. External fixation was used very rarely, not at all at this hospital. (No use of external fixation by pins has yet been seen in German hospitals, though the method is known and reported used occasionally.)

Military Training.—The German Army had no field school for dentists. Special oral surgical courses were given in civilian schools, varying from a week to a month in length. Such courses offered little opportunity for the student to work. It is reported that such schools were at Düsseldorf and Würzburg. Others probably existed.

Vincent's Infection—As is generally the case, it was stated that there were very few cases of Vincent's infection (Plaut-Vincent's angina) among German soldiers. It was further stated that there was a lower incidence among German military personnel than among civil-

ians. (This statement does not agree with that of American dentists treating German prisoners who claim a high incidence of sub-acute Vincent's infection. It seems probable that sub-acute Vincent's infections were routinely diagnosed, on clinical grounds only, as gingivitis.) The few cases seen were usually reported in the late spring and late autumn. Cases were not quarantined, but were cautioned about exchange of eating utensils or cigarets. Vincent's infection is not considered highly contagious nor an important military disease. (Note: The above information is reported as obtained. It does not always agree with that previously reported. It must be recognized that official records are nearly nonexistent, and information obtained is no more reliable than the individual giving it.)

Maxillofacial Surgery

Information on the practice of maxillofacial surgery in Germany and Austria was obtained in an interview with Dr. Arnold Aichinger at Gmunden, Austria. Prof. Dr. Aichinger was assistant to Dr. Pichler of the University of Vienna in the *Abteilung für Gesicht u. Kieferchirurgie (Wiederherstellungchirurgie)*. At the outbreak of war, Dr. Aichinger was taken into the Army as chief surgeon to the maxillofacial hospital in Vienna, which served *Wehrkreise* 17 and 18, comprising most of Austria. He was chief of this 360 bed hospital until the arrival of the Russians, when he, his staff and as many patients as could be moved were brought to Gmunden in western Austria. At the present time, this hospital has 106 cases under treatment, most requiring plastic repairs. Professor Pichler is believed to be in the Tyrol, but this is uncertain.

Plastic practice at this hospital seemed much like that of American operators. The following points were noted in examining cases:

Flaps of mucous membrane, about 1½ mm. thick, thicker at the pedicle, are used within the mouth for minor repairs, for example, for the creation of a sulcus between mandible and lip.

Sulci between mandible and lip are also created without grafts merely by placing a stent covered with iodoform gauze until epithelialization takes place. Thiersch's grafts have been used, but are not liked in the mouth because of the frequency with which they have been lost.

Palates are recreated by using a bone graft from the curved lower tip of the scapula. This graft is first buried in the abdomen, and later raised and the edges of skin folded under the bone to cover both sides. When transferred to the mouth as a pedicle graft after a preliminary transplant to the arm, the bone is covered with soft tissue so that contact with saliva is minimal.

Depressed fractures of the body of the zygoma are raised by inserting a strong hook, after trigeminal nerve block, between the eye and the bone at the floor of the orbit and into the inferior orbital fissure. After reduction by outward manual tension, the case is immobilized by a headcap and a wire making a loop around the zygoma and through the inferior orbital fissure. In cases of severe comminution, a Caldwell-Luc operation is done and the sinus packed with iodoform gauze which is left ten days.

Eyelashes are replaced with narrow free grafts from the edge of the hair line of the neck. These are not always successful, however.

The bony floor of the orbit is replaced by a free graft from the scapula.

Bone grafts for the jaw are usually made as a sliding graft from the largest remaining section of bone if at all possible. Fragments are first immobilized with a plastic splint; the horizontal segment freed for the graft is moved to position and wired directly with stainless

steel. If remaining segments of the mandible are too small for this purpose, a graft is taken from the crest of the ilium. Osteoperiosteal grafts from the tibia are used for replacing the bridge of the nose, but are not used for jaw work. Rib grafts are not used.

Flaps for the face are taken from as near the area to be filled in as possible. For example, upper lips are created from flaps taken from alongside the alae of the nose.

Cartilage is not used to replace chins. Fat is used, stated to come from the facial area (where it is obtained is not definite). From actual inspection of cases, it is believed that very little building out of chins, beyond uniting fragments with bone graft, is practiced.

In the facial area, flaps for plastic operations are raised two to three weeks before the final operation and are immediately sutured in place again as a measure to increase the blood supply through the pedicle.

Acrylic eyes are used only as pink acrylic inserts to retain space pending insertion of a permanent glass eye.

Dr. Aichinger mentioned a book on war surgery and medicine ("Kriegschirurgie und Kriegsmedizin") in three volumes printed by Deuticke in Vienna. This work was a symposium on war surgery and medicine by specialists of the Vienna School and was said to be widely distributed in the Army. Jaw surgery was limited to a small section by Dr. Aichinger in the first volume.

General Stabsarzt Alfred Zimmer was surgeon for upper and lower Austria and Vienna during the war and until February 1945, when the Russians arrived in Vienna. He is thought to be a prisoner in Vienna, though still carrying on his work. He was succeeded by General Stabsarzt Hennberg, who was not from the University of Vienna group, and who now has his headquarters in Gmunden, where he cooperates with the American military in operating the many German hospitals in the area.

Dr. Aichinger says that there were in Germany ten maxillofacial hospitals as follows (name of principal surgeon given when known):

Berlin (Z)	Drs. Oxhausen and Wasmund
Vienna	Dr. Aichinger
Düsseldorf	Dr. Lindemann
Munich	..... (bombed out)
Breslau	Dr. Pervitschky
Dresden	.....
Frankfurt	.....
Hamburg	.....
Kolberg	Dr. Schlampp

Drs. Wasmund and Pervitschky were reported in or near Würzburg two months ago.

The University of Vienna was almost completely destroyed during the war, but according to latest information the dental school and clinic are intact.

Oral Surgery

The subject of oral surgery in Germany and Austria was discussed with Dr. Hofreiter, at Gmunden, Austria. Dr. Hofreiter was assistant in the *Wien Poliklinik,* associated with the University of Vienna, in general surgery from 1926 to 1930. From 1930 to 1938, he was assistant to Prof. Dr. Pichler, chief of the maxillofacial section of the same clinic. He entered the Army in 1939, continued his work and remained in Vienna doing military maxillofacial work till arrival of the Russians. At present, he is principal maxillofacial surgeon in the Cumberland Hospital for German prisoners of war at Gmunden. He is currently treating 160 jaw cases.

Some points discussed with Dr. Hofreiter are as follows:

Policy at this hospital regarding débridement is much like our own. All possible skin and bone are conserved. Actually there was seldom opportunity to do débridement at the center as it was usually performed at the *Feldlazarett* before evacuation.

New, clean wounds, without excessive

bone involvement, were closed immediately with rubber drains left in place. Most wounds seen here were several days old. Primary closure was seldom done at the field hospitals. Thus most wounds were left open for a week or ten days before closure. When finally closed, the edges were roughly approximated with lead buttons and stainless steel tension sutures. No smaller sutures were used to draw skin edges into close approximation.

Sulfa drugs were not used prophylactically in jaw surgery. If a severe infection developed, the patient was put on a schedule of decreasing dosage (12 gm. the first day, 10 gm. the second day, 8 gm. the third day, etc.). If infection was less severe, 4 to 6 gm., decreasing as above, was given daily.

Whenever possible, bone grafts were of the "sliding" type from the larger remaining fragment of the mandible, wired in place with steel wire. This type of graft was done as soon as healing of the soft parts was complete. Free grafts were from the crest of the ilium and were delayed until at least six months after healing was complete. Osteoperiosteal grafts were used for the bridge of the nose, but not for mandibular work. Rib grafts were not used. Grafts from the ilium were sometimes embedded in an area later to be used for pedicle graft and thus had blood supply from the pedicle when finally moved with the soft tissue to their final location.

Most fixation of bone fragments is done with acrylic splints. These splints are hinged at the heels and the labial half is cut at the midline in front so that the facial sections may be swung laterally for insertion. When inserted, the two facial sections are again approximated at the midline and fastened with a screw. Impressions are usually taken with plaster, but the natural undercuts of the teeth are not relied on for retention of the splint. Before the impression is taken, stainless steel bands are adapted to several sound teeth and a "tit" of solder is added to the band. This projection on the band appears as a depression in the finished splint. The bands are cemented to the teeth, and, when the splint is applied over the bands, the projections on the bands fit into the depressions in the splint and prevent its removal. This modification seems to be made necessary by poor impression technic.

Headcaps are used when necessary to provide backward tension to a ramus or support for a maxilla or for fractured nasal bones. Headcaps are in general very simple, with support provided through heavy wires which are bent to desired form.

Extra-oral fixation with pins was reported used occasionally in civil practice, but was not used at all for military patients. It was not very well liked.

Circumferential wiring is occasionally done in edentulous cases, but a splint with bandage support is preferred.

Direct bone plating is seldom done around the face. It is especially undesirable when plastic procedures are to follow.

Flaps for facial repairs are taken from a horizontal area on the neck just below the larynx or, if larger flaps are required, from the horizontal area lying just below the clavicle. The older method of taking vertical flaps from the chest inside the nipple-line has been abandoned here. It is believed that the tissue obtained just below the larynx or the clavicle is more like that of the face. Abdominal flaps are not used as widely as in Dr. Aichinger's hospital.

In this hospital, Thiersch's graft is widely used to form a vestibule for the mouth.

Impacted zygomas are brought out with heavy elevators used intra-orally. Great faith is shown in iodoform gauze. Comminuted fractures of the zygoma are packed out with iodoform gauze and left ten days. If plain gauze is used, it is left only four days and is then replaced. No iodoform is at present available.

4. *Socialized Dentistry*

The social insurance system of Germany was incredibly complex and its operation was entrusted to many official and semi-official agencies. The following discussion describes the system in its simplest aspects, without spending too much time in differentiating between various groups doing approximately the same work in different cities or within different groups of insured persons.

Socialized dentistry in Germany was only a part of the comprehensive social insurance scheme, which included medical care, dental care, unemployment benefits, disability benefits, accident insurance and old age benefits. A levy of about 7 per cent was made on the salary of every employee in the insured class, and the employer paid in an amount equal to half that paid by the employee. Insurance for every employee making less than three hundred *marks* a month was mandatory. Persons making more than this amount could not enroll in the public insurance system unless they had previously been members while making less than this amount, in which case they could retain membership. Other persons making more than three hundred *marks* monthly could enroll in one of the many private insurance systems or could pay medical bills on a fee basis.

Funds for the various benefits named above were kept in a common account and paid out by the same agencies. The laborer paid only on the basis of his salary. Before 1933 the beneficiary paid according to the size of his family as well as according to income, but, with the advent of the Nazi party, this extra charge was abolished. Present state insurance plans provide for full care for workers' families.

The central insurance fund allotted eight *marks* and forty *pfennigs* quarterly for each insured employee to cover all medical expenses. As nearly as can be determined, this was about $2, though in the absence of a free market for the *mark* it is difficult to relate the *mark* to the dollar in buying power. This meant that $8 per insured family per year had to cover all medical costs. (This sum did not include disability payments for loss of time.)

As originally set up, the insurance system functioned on a purely local basis, with only moderate supervision from the central government. With the advent of the Nazis, however, the system was centralized in Berlin, so that all funds collected were sent to Berlin first, and were subsequently disbursed from there. There was a *Reichs* office for insurance, and under this a series of *Oberversicherungsamt* having regional control and a more numerous series of *Landversicherungsamt* having authority within provinces.

Within cities and counties the insurance system became more complex. Within each of these units were found two distinct types of insurance corporation, the *Reichs Versicherungs Ordnung* (Par. 123) type and the *Versicherung für Kaufmänischeangestellte und Beamte*. These corporations are usually referred to by their initials as *RVO* and *VKB*. These were semi-official organizations, under control from higher offices but with a measure of local authority. The director was usually nominated locally, for instance, though he had to be approved from the central office.

RVO consisted of three separate groups, as follows:

1. The municipal, or *Ortskrankenkasse*, group. This was the common insurance group which any laborer within the prescribed salary range could join. It was operated by local directors determined by the community. It functioned independently of the local government, however, except that the municipality guaranteed the adequacy of funds and exercised general control through the director. It was, of course, a non-profit

organization, and excess funds were used to operate hospitals and convalescent homes. As in all the public insurance systems, the employees' contribution was collected by the employer and turned in to the fund. This money was forwarded to the central office in Berlin, which in turn paid out fees to medical personnel once quarterly, on the basis of vouchers submitted for work done. Every employee had to be insured and it was the responsibility of the employer that the proper collections were made. Domestic help was not exempt.

2. The *Betriebskrankenkasse* groups. Many larger commercial organizations (I. G. Farbenindustrie, for example) preferred to control their own insurance plans. In such cases benefits for their employees could be integrated into the public insurance system. In these cases, the company collected the same fees as were collected from employees under the *Ortskrankenkasse* system described above. The company did not send these funds to Berlin, however, but accounted for them themselves, paying to the Berlin fund enough money to cover vouchers turned in for treatment for their employees. Their employees went to the same dentists and physicians as did other employees, and had freedom of choice within the panel, which included most of the medical personnel in the vicinity. As surplus funds did not go into the municipal account, however, these companies had to furnish hospitalization for their employees at their own expense. This was, in fact, one of the benefits of the *Betriebskrankenkasse* groups, which were more popular with employees, in that it was felt that hospitalization furnished by the companies, who were more interested in their employees, was on a better scale than in the public hospitals. As a matter of fact, however, it had become increasingly common for these company insurance systems to arrange to hospitalize their employees in the municipal hospitals, paying a fee therefor. This trend was partly to avoid the overhead of operating a hospital and partly because it has been found that the municipal hospitals get their patients out in less time and thus avoid absenteeism and excessive payments for disability. Many companies paid more liberal benefits than did the public system. Payment for disability in the public system was limited to six months, for instance, while companies often paid up to a year. It should be emphasized, however, that the company insurance systems were part of the public system, that no private contracts were made with dentists or doctors, and that patients under this plan were treated by the same doctors as were the municipal patients.

3. The *Innungskrankenkasse* groups. These were organizations on a craft basis (i.e., bakers, tailors) who preferred to operate their own system. Their groups were operated substantially as were the *Betriebs* groups which were operated by large commercial firms.

The *VKB* group was established for employees of a slightly different classification than those included in the *RVO* groups. These were the more highly skilled workers, the foremen, engineers and salaried office employees. These people paid the same percentage fees, but as their incomes were generally higher, the fees collected averaged more than for ordinary employees. This group therefore paid out somewhat higher fees for work done, though usually limited to fees for prosthetic work. Thus the fees paid for fillings were the same as for other groups, but *VKB* paid double the common fee for dentures. This group also benefited somewhat from the fact that they were better medical risks. As medical and dental funds were handled together, this meant that the saving on medical care could be applied to dental treatment. Employees eligible for the group could belong to the group for ordinary laborers if they chose, but as there was no difference in the fee collected they seldom

did so. An ordinary laborer, on the other hand, could not belong to the *VKB* group. The *VKB* group paid the full cost of dentures, while the *RVO* group paid only three-quarters of the cost.

The patient from any of the above groups who needed treatment went to the local public health officer and got a certificate stating that he was entitled to treatment. This he took to the dentist of his choice, provided only that the dentist was enrolled in the *KZVD*. The dentist took the certificate and submitted it at the end of the quarter with vouchers itemizing the work done and the amount due.

Dental matters in regard to the insurance system were handled by a special organization to which every dentist doing this work had to belong. This was the *Kassenzahnarztliche Vereinigung Deutschlands (KZVD)*. Its head man was Dr. Ernst Stuck, a prominent Nazi, and officers of the organization were appointive from the next higher headquarters, on the *Führer* principle. This society published weekly papers devoted largely to administrative matters *(Zahnärztliche Mitteilung)*, handled disputes and coordinated matters affecting both dentists and insurance groups. It was not a scientific body. There was a corresponding society for non-degree dentists, the *KDVD*.

Contracts between individual dentists and the insurance groups were negotiated by *KZVD*. Peculiarly, these contracts vary slightly from area to area. Thus the fee for laboratory work on a vulcanite denture was less in the Rhineland than elsewhere in Germany. The reason for this variation is not clear. It seems to be based on areas rather than on location in urban or rural districts. It has been said that people in the Rhineland have worse teeth than others and that it was therefore necessary, to make insurance income balance outlay, that fees paid for work there be lower. This is not considered a very probable reason, however. Contracts were renegotiated from time to time and minor adjustments made in fees to bring expenses in line with actuarial experience.

In addition to the state operated insurance systems, there were in Germany many private systems. These were operated for groups able to pay higher fees than were the employee groups, and fees charged and paid might therefore vary from very low to very high. These groups made their own contracts with selected dentists and work performed was supposed to be of higher quality. Dentists authorized to do state insurance work could combine that practice with private insurance work, or private practice.

There is very little simon-pure private practice in Germany. From 50 to 60 per cent of all dentists belong to the state insurance system, and most of the treatment not given under this plan is handled under private insurance plans.

The *KZVD* could not make a dentist move to a town where it felt he was needed, but they could refuse a contract if they felt that no additional dentists were needed in an overcrowded city, and could thus indirectly divert the flow of dentists to areas where they were most needed. It was not considered practical for a young dentist to try to make a living in dentistry without a *KZVD* contract.

Fees paid by the insurance system were so low that only hurried treatment for a large number of persons daily would bring in a reasonable income. In estimating the following fees in terms of United States currency, the *mark* should probably be considered as worth about twenty-five cents. Its current exchange rate of ten cents is much below the actual buying power of the *mark*. Even at twenty-five cents, however, it will be noted that these fees would hardly be considered satisfactory in the United States even if the dentist were guaranteed all the work he could handle.

Local anesthesia	1.2 *marks*
Extraction	1.0 *marks*
Silver filling	1.0 *marks*
Root resection	7.0 *marks*
Postoperative care	1.0 *marks* each sitting
Night calls	Add 3 *marks* to above fees
General anesthesia	5.0 *marks*

In general the German population favors the insurance system, feeling that without it dentistry for many of them would be out of reach. Enthusiasm of the dentists is less marked, owing to the low scale of fees. It is true that dentists in Germany have a generally lower standard of living than in the United States, but this low standard is shared with the rest of the population and is probably inevitable until the entire German economy is directed to producing for the needs of the people rather than toward preparing for war. It is doubtful if as large a proportion of the national income would go to providing dental care under a system of private practice as is now devoted to that end under the state insurance system. Thus under the state insurance system a large amount of mediocre dentistry is done for many people, while under private practice a much smaller amount of better dentistry would be done for a much smaller number of people. The Germans, patients and dentists alike, recognize the fact and prefer their present plan.

Even under the rigid regimentation existing in Germany for the past twelve years there have been abuses of the insurance system. Dentists (and physicians) have collaborated with patients in submitting bills for work not done and in unnecessarily prolonging hospitalization or treatment. Such abuses have not been common, however, and are not considered sufficiently important to warrant discarding the whole plan. It is believed that future practice in Germany will continue to be carried on under this plan or under minor modifications of it.

It should be noted here that the non-degree dentists shared equally in the insurance system with the *Zahnärzte* or degree dentists. It seems probable that a merger of these two groups will occur as soon as permanent plans for the future can be made.

5. The Prevention of Dental Caries in Germany

This report is based on interviews with directors of three dental schools at Jena, Halle and Leipzig, with public health officers at Jena and Wuppertal, with the chief dentist of the state insurance system at Wiesbaden, and with a considerable number of military and civilian dentists.

As would be the case in the United States, there was no general agreement among the men interviewed regarding the cause or prevention of dental caries. Opinions expressed generally followed lines of thought well known in the United States but there was complete ignorance (with one minor exception) of the possible role of fluorides and either ignorance or skepticism regarding the possible relation between high acidophilus counts and susceptibility to caries. Owing to the conflicting opinions expressed on many subjects, no attempts will be made to correlate them, but representative opinions will be reported as expressed. A summary will be presented of those opinions and procedures generally agreed upon.

Dr. Franz Kinkel, chief dentist of the state insurance system at Wiesbaden (and prominent Nazi), believes that caries has increased in children during war, particularly in the age group which was approaching adolescence at the beginning of the war. (He also believes that periodontal disease has increased in older groups.) He believes that prevention of caries must be based on hygiene, early fillings and use of vitamins. Surprisingly

and apparently without rationale, he feels vitamin B complex to be most important. He had never heard of fluorine therapy, acidophilus counts or vaccines. Children in schools received semiannual dental examinations, and correction of defects was compulsory, either in a free school clinic or by a dentist of the parents' choice. Kinkel had no knowledge of recent research on dental caries.

Dr. Adolf Klughardt, director of the dental school, University of Jena, believes that the most important consideration is general diet; second, proper vitamins; and third, adequate child care (referring to home conditions, fresh air, exercise, etc.). Free dental care for schools has been provided in Jena for three years. School children were examined semiannually and treatment was compulsory. Expectant mothers received ½ litre of milk daily; babies up to two years received ¾ litre. Expectant mothers received vitamin D, dosage unknown (expressed as several drops of concentrate daily). Children in school received 100 mg. of ascorbic acid daily from October to April, as well as vitamin D. Expectant mothers and growing children also were given an increased butter ration. Children were taught oral hygiene in school, and were taught to eat vegetables and fresh fruit. They received ½ litre of milk daily in school. Dr. Klughardt thinks that until the Lactobacillus has been proved to be the cause of caries, Lactobacillus counts would be of little value. He does not believe that war diet has resulted in damage to teeth.

Dr. Otto Heinroth, brother and assistant of Dr. Hans Heinroth, director of the dental school of the University of Halle, believes diet to be of the utmost importance. He gives his own patients calcium phosphate, 6 gm. daily in preschool and early school years. School children get 100 mg. of ascorbic acid daily during the winter. Vitamin D concentrates were often given to school children in homes, but were not provided in schools. He believes the most important factors are too little calcium in the teeth (cause not known), inherited predisposition, poor hygiene and use of white bread and sugar. He would not state whether the diet or hereditary factor is the most important. He believes that an adequate diet helps, but will not prevent caries if hereditary predisposition is present. Dr. Heinroth had no knowledge of fluorine therapy or recent research on caries.

Dr. Johann Hauenstein, director of the dental school, University of Leipzig, believes that the wartime diet has resulted in more caries. He believes that caries is a result of "wrong ways of living," defined as "poorly chosen overrefined food, lack of vitamins found in fresh foods and general mode of civilized life." He quoted findings of Dr. Euler of Leipzig who examined skeletons of soldiers killed in old wars, tending to show that teeth of children raised in periods of national depression following wars (presumably raised on simpler diets) were better than the teeth of children raised during periods when the nation was in the ascendancy. He believes heredity to be important, but secondary to diet and mode of life. He has no knowledge of Lactobacillus counts but claims to have heard of fluorine therapy almost fifteen years ago. (He was very vague and we believe confused on this point, although it was made certain that he actually was referring to fluorine therapy and not to the role of fluorine in mottled enamel.) At any rate he was not favorably impressed with the idea that proper fluorine intake might reduce caries. He had no knowledge of recent research on dental caries.

The director of the Public Health Office at Wuppertal believes that the dental health of children suffered during the war owing to their diet and general dislocation of home life. Vitamin C was given to school children during winter. Vitamin D was given to many infants, but was not provided by the state. The

director had no knowledge of fluorine therapy, acidophilus counts or research on dental caries.

Others interviewed generally followed the lines of thought quoted above. Some conclusions generally agreed upon are:

a. Dental health of children reaching adolescence during the war has been adversely affected by dietary deficiencies. This point was not unanimously concurred in, and there is no visual evidence that German children did actually suffer such deficiencies. In France one is likely to underestimate the ages of children by three years or more, but German children appear sturdy, well filled out and normally developed for their ages. Owing to disorganization caused by the war, there is no statistical information available which proves or disproves this point and it must be accepted with reservations.

b. German dental educators believe that both diet and heredity may play a part in dental caries formation. They incline to place most emphasis on diet, probably because that is the only controllable factor.

c. Vitamins C and D are considered important to oral health.

d. It is not believed that dietary or other known measures will totally eliminate dental caries.

e. Fluorine therapy and use of Lactobacillus counts are unknown, as is the possible use of an acidophilus vaccine.

f. When the subject of "preventive dentistry" was mentioned in Germany, it was always first interpreted as meaning "early treatment." Actual prevention of caries is regarded without much optimism and, in spite of constant inquiry, no research along this line has yet been uncovered. In the event that such research is discovered, it will be the subject of a supplementary report.

6. Dental Plastics

The development of dental plastics in Germany has followed lines well known in the United States. The phenolformaldehyde compounds, the celluloids, resovins, vinyl chlorides and vinyl acetates have been tried and discarded until the acrylic resins have been left in practically sole possession of the field.

The principal manufacturer of dental plastics in Germany is Kulzer & Co. This company is a subsidiary of Degussa (Deutsche Gold und Silber Scheide Anstalt) which in turn has connections with I. G. Farbenindustrie. This firm had a large factory with a research department and dental clinic in Frankfurt until 1943, when it was completely destroyed by bombing. It was said that this plant used four tons of raw acrylic resin a month, and supplied a large part of Europe. After the main plant was destroyed, the company moved to the village of Friedrichsdorf north of Frankfurt and established a small factory, without research or clinical facilities, capable of supplying the needs of Germany. The firm did not make the raw materials used, but purchased the unprocessed acrylic resin from Rohm and Haas of Darmstadt.

I. G. Farbenindustrie produced an acrylic resin called "Perpax" (pink) or "Gingivist" (clear) but it failed to become popular owing to poor color. Vague reports have been heard that I.G.F. was working on a new denture base material, but questioning of all persons who might have any information in the matter has brought denials that such a product was under consideration. A request for information from the American authorities operating the Höchst plant has brought an unqualified denial that any such work was in progress. A request has been made through channels for information from the Leverkusen plant which is in British territory but it is considered doubtful if any important developments

will be brought to light by this inquiry.

Heko-Werke of Berlin also produced resin products, including a denture base ("Neohekolith"), a tooth-colored resin ("Hekodent"), a transparent base plate, plastic temporary filling material ("Hekopercha"), and plastic root-canal points. As this firm was located in Berlin, it has not been possible to get information regarding its products, other than to obtain samples of base plates, root-canal points and temporary filling material.

Among the denture bases, "Paladon," made by Kulzer, was by far the most popular. In powder and liquid form (no ready-mixed acrylics are marketed in Germany) it has a good shelf life and seems to be quite satisfactory. The color is not as good as similar products sold in the United States, but was stable and was superior to the I.G.F. product, which was too opaque. It was used by the Army and replaced rubber during the war when rubber became scarce. It will probably remain the most used base, after rubber becomes available, because of superior esthetic qualities. It was stated to absorb less water than vulcanite, but this claim is considered doubtful in view of experiments carried out by the Bureau of Standards on American products.

Among the acrylics for crown and inlay work, "Palapont" by the same company also was almost undisputed in its field. It came in six shades and a translucent shade, from which sixteen color combinations were derived.

Plastic base plates, which handle very well and make a transparent tray with obvious advantages for immediate denture work, were produced by Heko-Werke and I.G.F. Composition is not known but an attempt is being made to get the formula through the I.G.F. plant personnel at Frankfurt.

Plastic temporary filling material was produced by Heko-Werke. This material was apparently not well known in Germany and no reports as to its usefulness are available. It was tested clinically by one American dentist who gave only qualified approval. It softens quickly and seems to adhere well to a dry cavity. It sets very rapidly, however, and seems difficult to trim in the cavity. It is very hard when set and should be more durable than gutta-percha.

Plastic root-canal points were produced by I.G.F. at Leverkusen, but do not seem to have been widely used. They are claimed to be well tolerated by the tissues and their flexibility and stiffness make it possible to force them into place more easily than points made of gutta-percha. Apparently they were not available for a sufficient time for clinical reports to be made on them. Samples were obtained and are being forwarded.

Experimentation was being carried on in Germany on the use of acrylic resins for direct filling of teeth, with polymerization within the cavity. This work was being done by Kulzer and further progress was halted in 1943 with the destruction of their Frankfurt plant. The material was not named, though it was referred to as "Palapont, S.H." (self-hardening). It was never marketed, but had been given to universities and individual dentists for testing. It was also tested on employees and officials of the firm and this reporter has seen the material as used in practical cases.

This material was the same base as was used for "Palapont," corresponding to American products for inlays and jacket crowns. There was no change in granule size and the same organic colors were used. It was modified only by the addition of an accelerator to the powder which reduced the setting time to from ten to fifteen minutes. This accelerator was said to be a tertiary amine. Use of an infra-red lamp to hasten setting was recommended but was not considered absolutely essential.

The material was given the widest application in clinical testing. It was used for all types of fillings, including

occlusals, compound occulusal-approximals, incisal-approximals and gingivals. Most of these fillings were placed in 1943 and the margins were still good. The single occlusal-approximal filling seen, on the mesio-occlusal surface of the lower first molar, showed no signs of wear and the margins were good. It was very poorly trimmed, however, and seemed to fill the approximal space, with considerable overhang. It did not appear to have been placed with a matrix band although it was claimed that a matrix could be used. The material was kept dry for ten minutes after being placed in the cavity but was not protected by varnish after initial setting had taken place. The filling was trimmed after fifteen minutes. A novel application of the material was as a cement for the placing of bridges and crowns. Used as the cementing medium for an acrylic jacket crown, for instance, it was said to adhere so tightly to the tooth that it could scarcely be removed even after the jacket crown had been cut away, and it sealed the margins of the jacket crown so that they could scarcely be detected. In cases where gold shell crowns had worn through, they were simply removed and replaced using acrylic self-hardening resin as cement, sealing the holes and giving very tenacious adhesion. The material was also used to build up acrylic pontics in the mouth where porcelain pontics had fractured away. Cavity preparation was not changed for this material. It was not thought to require any more bulk than silicate cement. This reporter saw one distal-incisal filling on a left central incisor which had been in place over two years.

In spite of successes in clinical use of the material it was not yet considered ready for market, nor is it planned to put it out for sale until the research laboratory of this firm can be reestablished and further experimentation carried out. Two principal problems remain to be solved:

a. Shades are not permanent. The same organic colors are used as are used in "Palapont," whose colors are stable, so it is believed that the accelerator is the cause of the trouble. Colors tend to darken with aging.

b. There is some reason to think that pulp damage may result in deep cavities. This factor is uncertain, but is thought to require further study to decide whether the material actually is irritating to the dental pulp. It is believed that, if pulp devitalization actually results in some cases, the accelerator is again at fault. There is no proof for this belief, however. Pending further study of this matter, it is recommended that a cavity liner be used in all deep cavities.

A director of Degussa, Herr Hirtes, denied reports that similar products were being developed in France and Switzerland, and stated that the Swiss were working with samples of the Kulzer product which had been submitted to them for testing.

Complete samples of this product have been obtained with considerable difficulty and are being forwarded.

The processing of acrylics in Germany varies in some points from general practice in the United States. At first casts were tin-foiled but as vulcanization technics were replaced by boiling technics the use of any separating medium was gradually abandoned. Present practice is to paint the cast and secondary investment, after boiling out, with about three coats of 30 per cent calcium chloride, allowing each coat to sink into the plaster before adding the next coat. As explained in a previous report, the calcium chloride is said to raise the boiling point of moisture within the flask to a point where no vapor is formed. Another material used is sodium silicate (water glass) which also has been used, with indifferent results, in the United States. For use with a vulcanizing technic, the firm of Heimerle und Meule of Pforzheim marketed a material called

"Viton" which was a solution of a plastic produced by I.G.F. having the trade name of "Celit." As with other I.G.F. products, the exact nature of this material is unknown. (The director of Heimerle u. Meule did not himself know the formula.) Request for information regarding this material was included in the list submitted to the present control of I.G.F. Samples have been obtained and are being forwarded.

Plastic teeth are in common use and were, in fact, almost the only type available at the end of the war owing to the shortage of precious metals for pins. They are of good shades, and were well liked. They were made by a large number of small firms all over Germany and molds were even sold for use by individual dentists who wanted to make their own teeth. DeTrey in Berlin and Wienand in Sprendlingen were the two largest producers. Plastic teeth produced in Germany were similar in every respect to those produced in the United States.

Summary

No new basic plastics for dental use have been discovered in Germany.

New applications of plastics which are probably known in the United States are being made in their use for transparent base plates, temporary filling material and root-canal points.

Results of experimentation with acrylic resin as a material for direct filling of teeth justify the belief that this material may ultimately supplant the admittedly unsatisfactory synthetic porcelain cements.

7. *Gas-Cooled Dental Burs*

In an early July issue of *Stars and Stripes* there appeared an article stating that an Army dentist (Capt. John A. Leblanc, 407th Infantry) had found hollow dental burs in Gifhorn, Germany, which were cooled by a stream of air and which were stated to make cavity preparation painless.

No previous record of any such device had been found on visits to bur manufacturers, universities or dental operators and immediate steps were taken to get all available information. An attempt was first made to reach this unit by phone, but this proved impossible after two days of effort, and a trip was made two hundred miles to the last known location of the unit. On arrival it was found that the unit had moved from the area the previous day to a point near the Czechoslovakian border. A letter requesting details, drawing and samples if possible, was sent to Captain Leblanc, but when another investigator from this office was found to be going into that area he was requested to get the necessary information.

This investigator (Major Galvin, MAC) found the following information:

1. Captain Leblanc had seen the apparatus in the office of a German civilian dentist in Gifhorn and had used it on a very few patients in his own unit. Two of these patients were available at the time of Major Galvin's interview and reported that they had "felt no pain." It is not known what types of cavities were excavated for these patients.

2. The report carried in *Stars and Stripes* was inaccurate in that the burs themselves were not hollow, and there was no circulation through the bur. The handpiece, which was the important item, was cooled by means of a copper coil through which a stream of carbon dioxide gas circulated. The bur was cooled only by conduction of heat away from the cutting edge through the shank. In view of the low conductivity of steel, the effectiveness of this method is open to question. (Experiments in the United States [University of Illinois?] have shown that the cutting edge of a bur may develop temperatures up to 300° F.,

while the shank remains relatively cool.)

3. The handpiece in question is not a German invention. It was developed and patented in Switzerland. The dentist in Gifhorn had no part in the development or production of the apparatus.

4. Captain Leblanc did not know the name of the dentist in Gifhorn, nor did he have samples or drawings of the equipment. He did not know the name of the manufacturer in Switzerland.

Subsequent questioning of dentists, supply men and university personnel over most of the American occupied area of Germany failed to bring out any knowledge of the apparatus beyond one or two vague rumors that such equipment had been heard of in Switzerland or Sweden.

In the absence of definite clinical data, the effectiveness of this apparatus in controlling pain is open to question. It is a matter of common experience, of course, that even the touch of an explorer may cause intense pain in a sensitive cavity and the use of even a perfectly cooled bur in such a cavity could hardly be painless. If additional information is considered of sufficient importance, it would seem that, as the item is patented in Switzerland, such information could be readily obtained through American commercial representatives there. Gifhorn itself is now, and was at the time of the publication of the article, in territory under British occupation.

A report has also been received from Dr. Charles B. Jones, an American civilian expert on metallurgy and surgical instruments, that he saw recently, in a "metallurgical laboratory" (name unknown) in London, dental burs which were hollow and designed to be filled with metallic sodium to speed conduction of heat along the shank. It is claimed that this device has been used in aircraft motors, where valve stems have been so treated. This information was given to Col. Thomas Smith of the Office of the Chief Surgeon, Hq. USFET (Rear), who was making a trip to London, during which he intended to get additional information on this matter.

8. The German Dental Industry

Dental Manufacturing in Herrenalb

Herr Emil Huber, of Herrenalb, before the war was a prominent wholesaler of dental products in Karlsruhe, where he had a three-story building about fifty by one hundred feet. He was apparently progressive, had visited the best known dental manufacturers in the United States in 1937, and in 1936 had patented the "hand form" shape of handle for dental cutting instruments which has been favorably reported by American dental officers. In 1940 he designed the twelve dental chests making up the German dental equipment with the help of dental manufacturers and dental officers. He thereafter assembled these chests for the German Army, using equipment produced all over Germany. The chests themselves were made by Ritter A. G. (German subsidiary of Ritter of Rochester, N. Y.) at Durlach. Chests of drawers were made by Lichmetallwerke in Rogensburg, a branch of Messerschmitt. Most instruments were made by A. G. für Feinmechanik (vormals Jetter u. Scheerer) of Tuttlingen. This company alone produced nearly 60 per cent of all dental instruments made in Germany before the war and Huber was thus able to get a standard sized instrument in any needed quantity and could design his chests with definite "nests" for each item. Ritter also provided the polishing motors and x-ray machines.

Complete sets of these chests have been sent to the United States for intelligence purposes. The following quantities were assembled by Huber:

Chests 1 to 4 (operating unit)	1,500 each
Chests 5 to 8 (laboratory)	400 each
Chests 9 and 10 (steel technic)	400 each
Chest 11 (roentgenogram)	500 each
Chest 12 (heavy surgical)	200 each
Approximate cost of these chests was:	
Chests 1 to 4 (total)	3,000 *marks*
Chests 5 to 8 (total)	1,500 *marks*

Figures on others are not available.

The chests themselves were first designed in wood but aluminum was found more satisfactory and was used for most of the chests produced. Toward the end of the war, however, shortage of aluminum forced the production of chests in steel. The twelve chests contained 1,500 separate types of items made by 300 manufacturers.

The steel-casting machine (electric arc) was of Italian design and partly Italian produced.

Herr Huber reports that Kulzer & Co., formerly of Frankfurt, but lately of Friedrichsdorf near Frankfurt, was developing a plastic material for direct fillings (polymerized within the cavity).

He also reports that I. G. Farbenindustrie was developing a new plastic, superior to the acrylics, which was expected to be marketed in two or three years. I. G. F.'s present plastic ("Perpane") is not considered good.

Dental Manufacturers in Munich

Ultradent Fabrik (Ostner u. Pohlman), Georgenstrasse 61.—This small plant made simple units before the war, without cuspidors and with built-in air compressors. A few heavy castings were made in other factories in Munich. Otherwise all machine work was done here. Motors and engine arms were purchased completed. Its maximum production in peace was twenty units monthly with twenty employees. During the war the company employed fifty men making airplane parts. At present it plans to repair damaged units, of which there are many in Germany. Full production depends upon availability of raw materials. Damage to the plant is not over 15 per cent.

Antaos Werke, Hansastrasse 25.—This firm has united with C. W. Zipperer and J. Beutelrock u. Sohn. It produces nerve broaches, broach holders, automatic pluggers, handpieces, spatulas, excavators, pluggers, mirrors, scalers, cotton pliers and a wide range of small dental items. The factory is equipped to make burs, but considers them unprofitable and uses the machines for making nerve broaches and Beutelrock drills.

In peacetime the company employed eighty men. During the war only sixty to seventy were employed. No items were produced during the war other than the normal peacetime production. Handpieces were made in Berlin and the factory is believed destroyed. Stock is now on hand for three months' production of nerve broaches and excavators. Mirrors cannot be made owing to the shortage of German silver. This firm had no other branches except the handpiece factory in Berlin.

Steinhofer.—This firm is a large wholesaler but not a manufacturer. It is said to make sterilizers, but these, of common type, were actually made by Hans Muller of Munich. The firm has patented a hemostatic forceps in which a guide on the handles prevents overlapping of the handles on closing.

Dental Manufacturing in Tuttlingen

Tuttlingen and Solingen are the principal surgical instrument manufacturing areas in Germany. Tuttlingen, however, produces about 80 per cent surgical instruments and 20 per cent cutlery, while the reverse proportion is the case in Solingen. The largest firm in Tuttlingen, Jetter und Scheerer, employed about 2,000 men. Gebruder Martin, Adolf Schewikardt and Chiron Werke were progressively smaller concerns. Damage to Jetter und Scheerer was considerable as far as roofs and buildings were concerned, but machinery is intact and pro-

duction could start with very little delay.

Lieutenant Wallerich of the Medical Intelligence Branch has previously visited all the instrument manufacturers in this area and has reported on production capacity, methods and all matters concerning the business of instrument manufacturing. Very little was learned of a dental nature. Like most large instrument companies, the firms in Tuttlingen made those designs which were demanded by the wholesalers, and which could be sold in quantity. Jetter und Scheerer, for instance, gave up designing their own instruments nearly forty years ago, after several attempts to influence the trade to accept new types. They do not even have a dental adviser on their staff, but only make what is ordered by dealers. Their principal innovation in dental instruments during the past ten years was the introduction of the "hand form" cutting instruments and hand instruments produced under a patent held by Emil Huber, a dealer in Karlsruhe. These instruments have a hollow handle and are well liked in Germany and by American dental officers who have used them. (They were supplied for German dental field outfits.) These handles were designed for construction of stainless steel but a shortage of this material forced their construction of German silver or brass.

Jetter und Scheerer made most of the hand instruments for the German field dental outfits assembled in Karlsruhe by Emil Huber. At first they were not given a portion of this work (because, according to Herr Scheerer, they refused to pay graft) but were later called in because the smaller firms could not handle the volume required. Very early in the war an agreement was reached (under government supervision) whereby standard designs were accepted by all manufacturers, even in Solingen. This important step made it possible to design field chests with an exact knowledge of the size and shape of every instrument which would have to go into them.

Damage to other plants in Tuttlingen has been confined to the business office of Gebruder Martin. As a whole, the industry was very lightly damaged.

Only hand instruments are made in Tuttlingen. No burs, handpieces, engines, units or other dental items are made there.

Dental Industries in Stuttgart

Dental manufacture in Stuttgart was unimportant. The following firms were investigated:

Gesellschaft für Electrotherapie, Morikestrasse 17.—This small firm had been completely destroyed and no responsible employee could be located. This firm made a machine for the ozone treatment of root canals, periodontoclasia and stomatitis.

Dr. Karl Gonser, Calwerstrasse 41.—This small pharmaceutical house (five employees) makes routine mouth washes, tooth pastes and similar items.

Sistrah Licht Gesellschaft, Hassenbergstrasse 31.—This large firm makes all types of lamps (floor lamps, table lamps, surgical and dental lamps). It makes routine cluster and directed-beam lights for dental use. It was not damaged.

Sti Be Carl Bachmeier, Werastrasse 3.—This very small factory made routine glass syringes. It was completely destroyed.

Dental Manufacturing Concerns in Pforzheim

Pforzheim once had many small firms engaged in the production of dental alloys. Gold and silver working were introduced here about 1650. The town suffered one devastating raid at 0300 on February 23, 1945, and was practically demolished. It has been exceedingly difficult to get information here as the population was scattered and even street numbers are often difficult to locate.

Business records are nonexistent and information is only as accurate as the memories of the persons questioned. The following firms were investigated:

Walter Pfenning, Bleichstrasse 48.—This firm employed about seven men in peacetime and produced dental alloys of gold and silver. It was completely wiped out by bombing.

Dr. Th. Wienand, Maxmillian Strasse 161: (Factory at Museumstrasse 8).—This firm produced dental alloys of gold and silver. It employed fifty men in peacetime and a lesser number during war. It produced no military supplies. The factory is at present 85 per cent destroyed.

Several types of alloys were made at different times during the war according to the availability of strategic materials. Before the war the platinum was called in and nickel was substituted in the clasp metals. A typical formula for casting wire was:

Gold	.750	Silver	.120
Nickel	.030		

Three per cent nickel was thought to give the same hardening effect as 5 per cent platinum.

As gold became more scarce, palladium and silver were substituted. One formula was:

Gold	.100	Copper	.070
Palladium	.200	Zinc	.020
Silver	.610		

This alloy was used in plate form for crowns and also as ready formed crowns (marketed as "Phoebus" alloy, 1940). With 4 per cent less silver and 4 per cent more copper it was used for casting inlays and for crown and bridge work. It could be soldered and was considered fairly satisfactory, and was said not to discolor.

"Silodent," an alloy without gold or palladium, was marketed in 1940. It contained:

Silver	.830	Copper	.070
Tin	.060	Cadmium	.040

It melted at 750° C. and could be soldered with a solder containing more cadmium and a little zinc which melted at 680° C. It was used for inlays, crowns and bridges, but was not used satisfactorily for clasps. It was gold plated after fabrication, to prevent discoloration.

No palladium was available after 1940. Dentists who had gold scrap on hand sent it in and had it remade into gold alloys of from 16K to 20K. This factory produced no steels.

Dr. Wienand believes palladium-silver alloys are satisfactory for crown and bridge work and will be used after the war. They must contain at least 20 per cent palladium, however. (Crown and bridge work in Germany does not mean appliances made with three-quarter crowns and slice preparations. It usually means full crowns on all abutments, with heavy pontics.)

Dentaurum, Guterstrasse 44.—This firm did not alloy metals but fabricated dental items and marketed alloys which it bought in quantity from large producers. It made stainless steel wire, sheets, mesh, band material and casting material, as well as precision attachments and orthodontic supplies. It marketed impression materials, fluxes, investment materials, waxes and other items used in casting technics.

The principal casting material sold by this firm was "Remanit." This alloy is said to be of secret composition of chrome and nickel and is said to contain no iron. (This information does not agree with that obtained from Dr. Falck at Munich, who said that the alloy also contained iron, and closely resembled "Wipla V2A".) It is made by Deutsche Edelstahlwerke at Krefeld, near Aachen, and costs 18 *marks* per kilogram. "Remanit" is said to melt at 1110° C. and can be cast with ordinary gas, or acetylene, and oxygen.

The stainless steel wire and attach-

ments made here are 16 per cent Cr, 16 per cent Ni and 68 per cent steel.

Stainless steel was cast in Al_2O_3 and $HgPO_4$ investment. It was soldered with a silver solder and special flux.

Dentaurum also produced a casting alloy of 75 per cent silver and 25 per cent tin which was similar to "Acrolite" in the United States. It was not satisfactory for strength or freedom from corrosion.

It was claimed that three principal stainless steels were used in Germany, all of about equal quality and substantially of the same composition. These were:

Wipla V2A	(Krupp)
Remanit	(Deutsche Edelstahlwerke)
Imuzit	(Rochling)

The formula for "Wipla V2A" has been previously given as: Fe, 74 per cent; Cr, 18 per cent; Ni, 8 per cent. "BH_3," a product of Steinlechner in Vienna, was not thought as good, as it was thought to oxidize more in casting owing to a higher iron content. This information does not agree with previous reports that "BH_3" differed only from "Wipla V2A" in having 2 per cent less iron and 2 per cent more chrome. Previous reports also favored "BH_3" over "Wipla" for casting purposes.

It was generally agreed that stainless steel could not be cast satisfactorily in inlays or units requiring great marginal accuracy. Inlays seen of this material had uniformly poor margins.

The Dentaurum plant in Pforzheim was completely destroyed and considerable work will be necessary before reconstruction can start. It suffered a direct bomb hit.

Degussa (Deutsche Gold u. Silber), Zerreuerstrasse 23.—This was the branch of the parent firm (office in Frankfurt) which produced dental alloys. Before the war it produced the usual gold alloys for inlays, crowns, bridges and dentures, employing about 300 men. During the war it continued producing dental alloys. Herr Schuck, who was sales manager for dental alloys, was the only person of authority who could be reached here and knew very little about the formulas of the alloys except that gold, platinum and palladium were almost unobtainable after 1940. The firm produced "Silca" of approximately 75 per cent silver and 25 per cent tin. This was the largest producer of dental alloys in Germany. It is 60 per cent to 70 per cent damaged. It is believed that accurate information on formulas will have to come from Herr Hirtes, a director in Frankfurt. All records here are destroyed and personnel cannot, or will not, give exact compositions.

Heimerle u. Meule.—Herr Ackerman, the superintendent, says the firm made principally dental alloys of gold and silver. It employed sixty to seventy men in peacetime. During the war it acquired another small firm and then employed a maximum of ninety men. It also made some silver wire for electrical instruments. It made dental pharmaceuticals also. The plant is now completely destroyed except for some of the heavy machinery which can be salvaged. The French were reported to have taken 5 kilograms of platinum, 8 kilograms of gold and 800 kilograms of silver from this factory.

This company produced the usual high carat alloys before the war but its most popular alloy was "Econor" of: gold, 10 per cent; palladium, 20 per cent, and silver, 70 per cent. This alloy was for inlay casting.

For a harder alloy, 2 per cent of copper was added. For clasps 2 per cent of platinum was substituted for 2 per cent of palladium. This alloy was not made after the start of the war owing to shortage of gold and palladium. It was used for all dental purposes "with the slight modifications noted" and was considered satisfactory. It did not discolor in the mouth. In 1941 "Argodent"

was marketed. This alloy is, approximately: silver, 90 per cent; cadmium, 5 per cent; copper, tin and zinc (in equal parts), 5 per cent. This material was used for crowns, bridges and inlays. It was used with the addition of a little more copper for cast clasps. It could be soldered with silver solder or with a special solder. It was usually gold plated after fabrication, as it discolored in the mouth. It was considered a substitute and, as soon as possible, the production of "Econor" will be resumed.

This firm also produced a lacquer for casts for use in vulcanizing acrylic resins. Called "Viton," it was a solution in an undisclosed solvent (said to be a common solvent but not remembered) of a resin called "Celit" supplied by I. G. Farbenindustrie. This was made at the Leverkusen plant.

C. Hafner Scheide, Belichstrasse 17.—Dental alloys constituted only 20 per cent of this firm's production. The firm employed altogether from thirty-five to fifty men. The factory was nearly 100 per cent destroyed.

Before the war the firm produced the standard high-carat alloys which were generally the most popular. It also produced the standard palladium alloy of 10 per cent gold, 20 per cent silver and 70 per cent palladium, which it marketed as "Pangold." It was used for inlays and crowns. For clasps, 5 per cent copper and 1 per cent zinc were added. When gold became unobtainable, the firm marketed an alloy of:

Silver	50 per cent
Zinc	5 per cent
Tin	40 per cent
Copper	5 per cent

This alloy was not considered very satisfactory. The firm appears to regard its dental department as a minor part of its business.

Hahnekratt u. Schray, Weiherstrasse 29.—This small plant produced dental gold and silver alloys in a two-room factory. The plant is so fully destroyed that only its approximate location could be ascertained.

Heinrich Lippert, Friedrichstrasse 66.—This small plant (three or four employees) made dental alloys. It was completely destroyed.

Ernst Vetter, Worthstrasse 9.—This small plant (three or four employees) made dental alloys. It was completely destroyed.

Emil Kusterer, Ebersteinstrasse 12.—This was found to be a dental laboratory only. It was bombed out.

A. Kast, Friedenstrasse 50.—This man was said by neighbors to have had a small jewelry store. He was not known to have handled dental alloys. He could not be located. Both home and store were destroyed.

Krupp-Renfert, Singen am Hohen Twiel.—This firm has been reported as manufacturing steel alloys for dentistry. On investigation it was found that the firm sold only the standard Krupp alloys which were furnished it by the Krupp factory in Essen. The firm also acted as agent for vitallium and a wide range of small stainless steel specialty items and instruments, which were made for it by other firms. It is not an original manufacturer.

Dental Manufacturing Firms in Freiburg

G. C. Wiese, Breisacher Strasse 17.—This small firm made burs. It was completely destroyed.

Heinrich Metzger, Runzstrasse 64.—This was a very small outfit making nerve paste. It is intact.

A. Rueb Inh. Joseph Schneider, Schwarzwaldstrasse 12.—This very small company makes laboratory brushes. It is intact.

Mr. A. Werner, Director of Ritter A. G., Durlach.—This firm is 98 per cent owned by the Ritter Dental Manufacturing Co. of Rochester. Its products (chairs, units, cuspidors, motors, air compressors, x-ray machines, operating lights,

cabinets) are made on designs determined in the United States. During the war it produced airplane parts, gages and parts for marine engines. The factory produced about a thousand units yearly in peacetime and also produced all parts for the French subsidiary of Ritter, in Strasbourg, France. The French factory made only assembled products. The plant employed 400 to 500 persons before the war. It was damaged very little by raids and can operate as soon as coal and steel are available. At present, the firm is working with about fifty laborers preparing the factory. At first only repairs of units will be attempted, pending availability of raw materials. The Pforzheim plant (cabinets only) was severely damaged by air raids.

No new products or developments were found in this plant, which has, of course, been closely linked to American production practice.

Dental Manufacturing Concerns in Karlsruhe

Badenia Dental Industrie (Dr. Hutt Fabrik, Kriegstrasse).—This small concern makes dental cements and anesthetic carpules. It was not seriously damaged.

Dr. Hochwar u. Co., Ruppurer Strasse 5.—This small company (four or five employees) made sterilizers as well as other nonmedical items. The company was completely destroyed.

Karl Huber, Kriegstrasse 128.—This was a two-room factory making dental cements. It was not destroyed but is not now operating. The proprietor could not be located.

Fritz Dietrich, Sedanstrasse 15.—This one-room factory makes celluloid strips. It is intact.

Theo. Sproesser, Ienzstrasse 11.—A small agent. Not a manufacturer.

Carl Rapp, Jahnstrasse 1.—Wholesaler only. Not a manufacturer.

SEARS HYDROCOLLOID IMPRESSION TECHNIC IN RESTORATIVE DENTISTRY

Z. Vance Kendrick, Jr., D.D.S., Charlotte, N. C.

The remarkable flexibility of the Sears impression technic in restorative dentistry obviates use of the direct technic in any type of cast restoration with the exception of Class V and Class III inlays, which are to be made simultaneously with other types of cast prostheses. These two classes of restorations may be made by taking an impression of these areas only. With only one impression, or occasionally three impressions as a maximum for each arch, this flexibility permits accomplishment of the following prostheses in order of complexity:

1. Single inlays or crowns.
2. Multiple inlays or crowns.
3. Inlays or crowns and a fixed bridge.
4. Multiple inlays or crowns, fixed bridges and a partial denture.
5. Any combination of these prostheses in conjunction with an increase of the vertical dimension.
6. Any combination of these prostheses in conjunction with precision attachments.

The factor which makes the use of hydrocolloid impressions and the resultant stone model a scientifically accurate and successful technic lies in the relative noncompressibility of water. Since, volumetrically, the hydrocolloids are composed primarily of water, and since it is the vehicle which permits flowing the material into almost microscopic ir-

Fig. 1.—Model representing jacket preparation, left lateral incisor, and modified pinledge, right central incisor, for reception of fixed bridge (practical case).

regularities of the tooth surface or cavity preparation, and since it cannot be compressed, an absolutely static impression is obtained. No other material will afford a static impression in detail and yet remain elastic; hence, hydrocolloid is the only accurate medium for producing a negative of irregularly shaped tissues. It is the only medium which will allow us to evolve an indirect technic having direct technic accuracy, yet retaining indirect convenience of handling.

Before seeing the hydrocolloid technic introduced by Dr. A. W. Sears, of Jacksonville, Fla., I had worked many months in an effort to produce accurate casts of prepared cavities from hydrocolloid impressions. For a number of reasons, including the wrong combination of materials and improper usage, the results were not consistent. As an example, some types of stone react unfavorably to certain hydrocolloids and either will not set or will yield an imperfect cast. In order to avoid disappointment, those materials that will assure the desired results will be specified where necessary. Equally important is adherence to technic detail.

Cavity Preparation

Any type of cavity preparation may be used, but at times certain modifications are desirable, particularly with reference to fixed bridge construction. For bridges, three-quarter crowns are very adaptable to this technic, the cavity being prepared with a slice and step and an occlusal groove which follows the outline of the average occlusal preparation in the posterior area. In the anterior, pinledges and three-quarter crowns are often suitable. Pins, in any type of preparation wherein it is possible to use them, offer great retention. They are particularly adaptable to this technic (Fig. 2). It is desirable not to have any undercuts, but they are permissible if not deep and sharp, since they may be blocked out on the stone die. Undercuts are not permissible in a narrow constricted space since their presence would cause a thin wall of hydrocolloid to tear. Caries extending deeper than normal cavity depth, except in close proximity to cavity margins, should be left undisturbed until after the impression is secured. Thus, a separate cavity lining is obviated, the lining and cementation being accomplished with one operation.

Impression

The impression is secured in the following manner:

For a bridge or inlays, a water cooled tray is employed. Both ends of the tray are blocked with any low-fusing impression compound (Fig. 5), after the tray side of the compound has been made

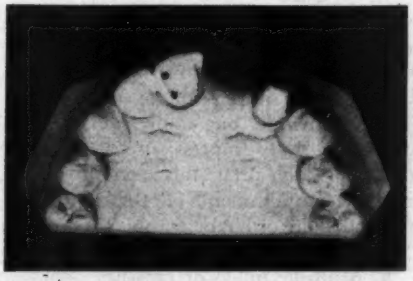

Fig. 2.—Palatal view of case showing pinholes in right central incisor. The mesial groove is countersunk at the gingival aspect.

tacky by flaming, in order to adhere tightly to the tray. The tray is carried to the mouth and carefully centered over the prepared area and then seated, but not deeply enough for exposure through the compound. At this time, the position of the anterior and posterior borders of the compound in relation to the teeth is noted, as an index for seating the tray later. If no teeth are present, the bone must be used as a bearing point or stop. The tray is removed while the compound is still soft and the surface chilled under tap water.

At this stage, the compound is neither hard nor very plastic, and may be cut readily without breaking. Any slight distortion is of no consequence. The compound is cut out of the tray over the prepared teeth and at least one tooth more included in the compound to be removed, both anteriorly and posteriorly. An undercut, which is desirable in the cut surface, can be obtained on the first cut of the compound by holding the knife at an angle to the tray. The compound remaining in the ends of the tray now provides stops to prevent the hydrocolloid impression from being cut through to expose the tray, retains the hydrocolloid at the tray ends and acts as a positive seat for the tray in completing the impression. The periphery is now sealed by adding compound on the borders of the tray and carrying it back to position in the mouth (Fig. 5). The compound is moistened slightly with chloroform or acetone applied with cotton, the excess being blown off with compressed air immediately. The hydrocolloid will now adhere to it. The hydrocolloid impression is now secured in the tray thus prepared.

Fig. 3.—Model representing case with ferrule in place on left lateral incisor preparatory to taking hydrocolloid impression.

Fig. 4.—Palatal view of case with ferrule in place.

The following procedure should be adhered to in the order given: All débris is removed from the cavity and unprepared tooth surfaces around the cavity margins. The prepared teeth are blocked with a cotton roll and dried with compressed air. Care should be exercised at this point not to cause gingival hemorrhage, since hydrocolloid is not compatible with blood in securing a detailed impression. From a large syringe or gun, the hydrocolloid material is injected into the tray, barely filling the space between the compound ends only. This is set aside and the surface allowed to chill. Meanwhile, with a small hydrocolloid syringe and, for the average case, a large needle, the cavities are overfilled. First, a small amount of the material is ejected on a towel in order to clear the needle and to be certain that the hydrocolloid will flow in a smooth homogeneous mass. Since all pin holes and close spaces should be injected first, the cavities are now injected by inserting the needle in the gingival crevice, then drawing the point toward the occlusal aspect, injecting continuously as the needle progresses and using some degree of force. A pud-

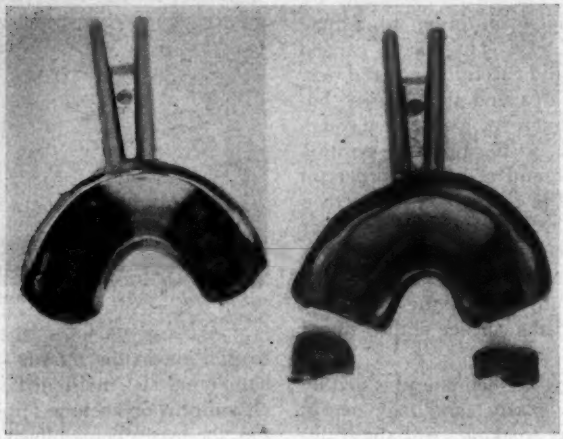

Fig. 5.—Right: Initial impression in compound. **Left:** Excess compound removed and beading of tray completed.

dling motion assists in the elimination of air bubbles. This procedure is repeated on all surfaces until the cavity including the embrasures is overfilled. With the cheek and tongue retracted, these tissues being held away from the teeth, the cotton rolls are removed and the impression is completed with the previously filled tray, which is chilled thoroughly with ice water. The impression is removed by grasping the tray handle firmly and exerting a quick straight pull away from the occlusal plane and in the line of least resistance. A determined effort should be made to dislodge the entire impression at once, carefully avoiding a tipping motion. The purpose in applying a quick, evenly distributed force is to avoid tipping and to overcome inertia suddenly, thereby reducing drag. (Fig. 6.)

Pouring the Dies

The impression is inspected for air bubbles on the margins or in pin holes of the prepared teeth. If any should occur here, the impression must be retaken. Bubbles in other areas may be disregarded unless they are too large. If the impression is acceptable, the dies should be poured immediately. The impression is washed gently in tap water, then in a thin wash of plaster followed by more tap water in order to remove adhering mucus and saliva. The surface is then carefully dried with compressed air. The proper die material, having been mixed on a glass slab to a smooth, fairly thick consistency, is flowed into the impression of the prepared teeth only by placing pea-size portions of the mix and vibrating to place on a mechanical vibrator. A cone of the material is now rolled in the fingers and placed over each tooth impression previously filled, this providing adequate excess (Fig. 7). This excess is later to be trimmed to root shape or to hold a dowel pin (Fig. 8). One exception to this procedure is to be noted: When very thin walls of hydrocolloid form the mesial or distal portion of the impression of an individual preparation, the die material is flowed on both sides of this thin wall simultaneously; for if the prepared tooth impression were filled alone, the weight of the die material would cause the thin wall of the hydrocolloid to be sprung outward mesially or distally or both, a distorted die resulting. The partially flowed impression is now placed in a humidor or

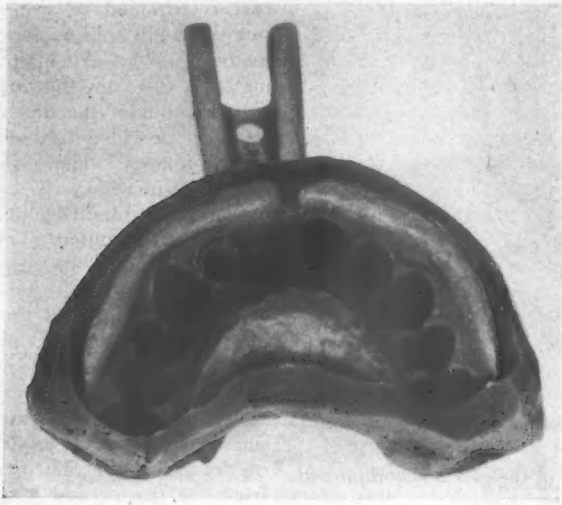

Fig. 6.—Completed impression in hydrocolloid with ferrule in place for reception of copper die of lateral incisor; showing pins in central incisor.

wrapped in a wet towel and the dies are allowed to set for at least one hour.

Trimming Dies

The impression is removed from the humidor and all dies are removed from the impression with a straight pull. With a five-eighths coarse paper disk, the excess is trimmed to a tapered root shape in the case of a small tooth. The average tooth is large enough to permit the root end to be tapered and then cut off at right angles to the long axis, and to permit a hole to be drilled in the cut end with a surgical bur. Into this hole, a tapered dowel pin is cemented parallel with the long axis of the tooth (Fig. 8). If the teeth are large, the dowel pins may be inserted in the die as the pouring of the die is being completed. This is accomplished by forming a ball of the die material on the end of the dowel pin and then putting this ball in place on the incompletely poured die. When possible, all dowel pins should be parallel, so that laboratory procedures will be facilitated.

Multiple dies of teeth the preparation areas of which are approximal require slightly different treatment in that the die material for all the dies flows into one piece and must be separated into its component dies. This separation is done by first cutting the die at the gingival aspect of the interproximal spaces to a depth of about 2 or 3 mm. with a ribbon saw, care being taken not to touch any cavity margins. Now the die is cut at its base buccally and lingually with a Joe Dandy disk. The piece is held with the teeth toward the operator and with the disk turning away from the operator so that the die cannot be damaged by the disk. In this position, the cut is made toward the interproximal space, first on one side and the base, then on the other side and base until the die has been cut through all but 2 or 3 mm. toward the previous cut made by the ribbon saw. Slight pressure on the base will break the thin isthmus of die material remaining. Each tooth may be so severed, trimmed and mounted on a dowel pin.

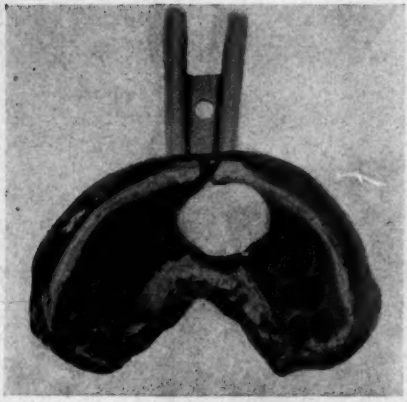

Fig. 7.—Impression with stone die flowed.

Completion of the cast is accomplished in the following manner:

The dies including the dowel pins are sparingly coated with vaseline by being rolled gently between the fingers to which a film of vaseline has been applied. A heavy coating is not desirable since it will not allow the dies to be seated properly in the impression. All dies are now reseated in their respective places in the impression (Figs. 9, 10). The vaseline serves to retain the die in place and acts as a separator for stone or wax. At this point, baseplate wax is flowed around each die at the joint between dies and hydrocolloid. Undercuts in the die and torn places in the hydrocolloid that would allow stone to flow into a prepared surface of the die are also filled with wax. The impression is boxed in and toothpicks are placed across the boxing beside the dowel pins and tacked to the dowel pins and boxing with sticky wax, this retaining them firmly in position (Fig. 10). Stone is flowed into the impression and over the dies, but not over the ends of the dowel pins, and the whole is placed in a humidor. After setting, the cast is separated from the impression, and the dies are removed by a light tap on the exposed ends of the dowel pins (Figs. 11 and 13). The cast is trimmed to size, the dies are put back in place and the cast is mounted on an articulator. In mounting the cast on the articulator, the exposed ends of the dies or dowel pins must be provided for. Three methods are as follows: The ends of the pins are boxed in with wax, the box extending laterally to the edge of the cast. The cast is then mounted. The ends of the pins are exposed by merely removing the exposed side of the wax box. A carding wax ball over the end of each pin may be similarly used. Another method is to cover the end of the pins with a wax ball, index the base of the cast with a knife, lubricate with sodium silicate and water (50-50) and mount on the articulator. The cast is separated from the plaster and a space cut over the ends of the dowel pins in either the plaster or the cast, or in both. The cast is reseated in the plaster as indexed and sealed in place with sticky wax.

In taking the bite for an occlusion model, a wax soft enough not to injure the dies and a gauze tray preventing plaster from flowing through and adhering to the dies are used.

Fig. 8.—Left: Rough stone die as removed from impression. Right: Die trimmed and dowel pin cemented in place.

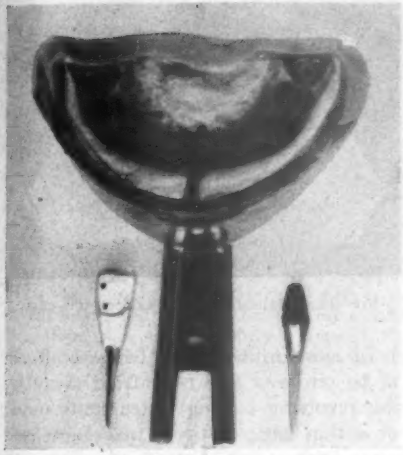

Fig. 9.—Stone and copper dies completed and ready for reseating in impression.

Wax Pattern

Any case under consideration would now be ready for carving of the wax patterns. In this step, the dies are first lubricated with an all-purpose waxing medium and each die is relubricated as the carving progresses. Patterns should be removed and invested as soon as is consistent with completion of the case as a whole. All detail, including occlusion, is carved as nearly like the case to be finished as possible. This is particularly true at contact points. On all margins, overextension is desirable. Occlusal and buccal or labial margins should be overextended faintly in the wax pattern. The gingival margin may be extended as far as is desired and later trimmed to proper length in the casting. In fixed bridge construction, soldering shrinkage is eliminated by investing and soldering each joint individually. This procedure is easily accomplished with the model (i.e., patient) always at hand in the laboratory.

Exposing the Gingival Margin

In any instance, the prime requisite for a successful impression is the ability of the operator to obtain an accurate impression of gingival margins, since a detail of other areas is easily secured. In order to secure an impression of this area, the cavity preparation must be entirely free from impingement by the gingival tissue. Freedom of access to the margins is accomplished either through disease of the gingival tissue such as to cause its destruction, special consideration of cavity preparation in regard to this tissue, mechanical displacement, chemical or surgical removal of the tissue or a combination of any of these considerations. In any event, the gingival margin or cavosurface angle must be freely accessible for the application of the hydrocolloid impression material. Several methods of mechanically displacing this tissue are available. The simplest method is to ligate the teeth under consideration with a cotton string tied with a square knot. This string is forced below the free gingiva. An astringent of zinc chloride 10 per cent or adrenalin 1:100 is now applied to the string. One or more strings are sometimes placed on the same tooth. In any case, the string should be applied as soon as each preparation is completed and allowed to remain until cavities are to be dried. On

Fig. 10.—Impression boxed in; dies lubricated, waxed in place, stabilized with toothpicks and ready for pouring of cast.

Fig. 11.—Completed cast with dies in place; dowel pins extending through cast.

Fig. 12.—Palatal view of completed cast.

removal, the string will have pressed the gum tissue away from the tooth, leaving a widened gingival crevice into which the hydrocolloid may be injected. Ligating the teeth with rubber bands is equally effective in displacing the gingiva. If the gingival margin is far below the gum tissue, it may be necessary first to cauterize, then to pack the gums away from the margins. The areas are blocked with cotton rolls and 1 or 2 drops of trichloracetic acid and eugenol (1 ounce eugenol poured into 1 ounce trichloracetic acid crystals, the solution being left in a syringe ready for use) is deposited in the area by means of a 1-cc. Luer syringe and a blunted and bent needle (26 gage). The tissues are allowed to turn white, the degree of cauterization being determined by the degree of whitening. The escarotic is removed by washing with water. Next, a thick mix of surgical paste is applied, being held in place under pressure by temporary stopping. In the case of full crowns, aluminum forms and surgical paste are used. The paste is allowed to remain in place for several days before the impression is taken. Application of trichloracetic acid and eugenol alone, at two sittings three days apart, before cavity preparation, often has the desired results without excessive and indiscrete gingival destruction. The tissue thus removed will invariably be replaced.

In most instances, the fringe of tissue to be removed will be carried away by the revolving cutting instruments used: or a thin edge of tissue may be teased away with a fine sharp blade. In such cases, the hemorrhage present must be controlled. Application of adrenalin chloride 1:100 followed by trichloracetic acid and eugenol will invariably produce hemostasis. Neither hydrocolloid nor the trichloracetic acid and eugenol escarotic is compatible with blood.

On some occasions, the operator is free to excise sufficient tissue. In any case, the gingival margin must be free of any foreign material, including the gingival tissues.

Fig. 13.—Completed cast with dies removed.

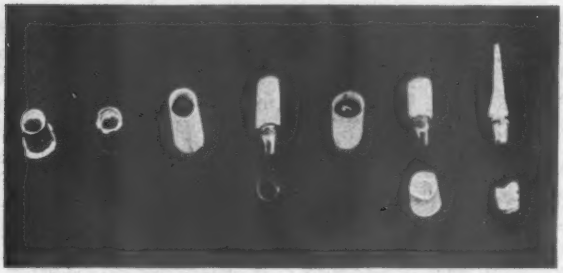

Fig. 14.—Copper die and ferrule. Left to right: Tube impression; impression copper plated; plated impression wrapped for pouring low-fusing metal core; core poured and die separated from impression; untrimmed die wrapped for pouring ferrule; ferrule poured and removed from die; finished die (with dowel pin) and ferrule.

In those instances in which hydrocolloid cannot be injected below the gingival margin, copper band impressions must be taken. Hydrocolloid in a perforated copper band may be used, the die being prepared and seated in the master impression.

If full crowns or jackets are used, a copper plated die[1] is made from an impression in compound or elastic impression material (Fig. 14). Ferrules or caps are poured over these dies from low fusing metal (Fig. 14). The ferrules[2] are trimmed, indexed and placed on the teeth in the mouth (Figs. 3 and 4), and a hydrocolloid impression is taken. The ferrules may come away in the impression. If not, they may be placed in position (Fig. 6), the die seated in the ferrule and the cast poured as previously described (Fig. 10). Ferrules are made by wrapping either paper or masking tape around the die to box it in, then pouring the low-fusing metal while vibrating the die. The ferrule is trimmed and indexed with carbolite disks. No other abrasive will cut low-fusing metal effectively.

This adjunct to the hydrocolloid impression technic is very effective in working with small teeth wherein fracture of stone dies would be very likely to occur. Equally effective is the ferrule in affording a positive seat for metal dies.

The metal dies and ferrules so used

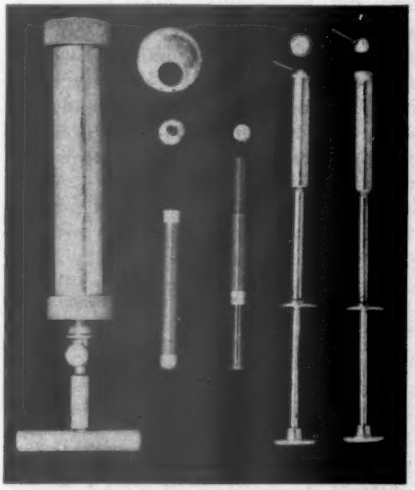

Fig. 15.—Syringes for using hydrocolloid. Left to right: Large syringe, cap and adapter for filling carpules; carpule with hydrocolloid partially removed for insertion into small syringe; small syringes with needles for cavity injection.

1. Sears, A. W., and McLain, F. L.: Simplified Copper Die Technic. D. Survey 19: 1327, September 1943.

2. Sears, A. W., and Wooster, H. L.: Modern Fixed Bridgework. D. Survey 20: 1008, June 1944.

have a direct bearing on rounding out an all-embracing technic and are often used in conjunction with stone dies in the same master impression, as is shown in the accompanying illustrations.

Preparation of Hydrocolloid

Hydrocolloid injected into empty local anesthesia tubes and with the rubber stoppers replaced remains ready for use indefinitely (Fig. 15). The material in solidified form is pushed from the carpule and placed in the small syringe for cavity injection. An adapter or nozzle for filling the carpules from the large gun or syringe is made by cutting and threading a three-eighths inch opening in the syringe cap. A wax pattern of the adapter is constructed to fit this opening and is then cast in silver (Fig. 15). A plug for the opening is made in the same manner.

After both the large and small syringes have been boiled for the required time, a needle is placed on the small syringe and the hydrocolloid tempered in a water bath at about 140° F. (the temperature depending on the brand of hydrocolloid used) for from ten to fifteen minutes. Hydrocolloid will remain ready for use at any time during the day after being prepared and maintained at the proper temperature.

Conclusion

In the exposition of technic as herein set forth, I am mindful of what appears to be a multiplicity of confusing detail. Objectively, I wish to cover all possible exigencies, and this paper should therefore be considered as reference material. Practically, a simple routine for securing an accurate impression can easily be evolved by the average operator. Once the technic is mastered, many variations, which have purposely been omitted, are possible.

When a competent technician is available, the time-saving factor in this technic is of inestimable value to the operator. If a technician is not immediately available, the stone dies may be flowed into the impression and allowed to set. The impression and dies, as yet untouched, may be wrapped in moist cotton, sealed in an empty anesthetic can and mailed to a technician familiar with this technic. This system has been used with complete success over a period of two years. In any case, the person who masters this technic will be many times repaid for the effort expended. In its final analysis, it is simple and effective, and it has no limitations other than those imposed by the ability of the individual operator.

1010 Liberty Life Building.

A CONSIDERATION OF THE POSSIBILITY OF HEREDITARY DIATHESES IN DENTAL CARIES

William L. Wilson, D.M.D., Boston, Mass.

The writing of this paper is motivated by numerous observations on dental caries in a family-type practice of dentistry, by an interest extending over several years in the fundamentals of genetics and by what I consider to be a failure in caries research to recognize some principles of heredity, the understanding and evaluation of which are necessary before the temporary obstacles to advancement in research can be removed.

Heredity, as well as environment, is a factor in physical characteristics and is instrumental in the development of most diseases. Under certain conditions, one or the other may appear to be insignificant, but their related nature may always be demonstrated. One extreme condition may exist where heredity appears to prevail regardless of the environment. Albinism is an example of this. The other extreme is seen in diseases wherein the hereditary background, as far as we know, may provide a universal susceptibility to disease, but environment assumes the major responsibility and a knowledge of heredity is of little practical importance. Examples of this are the common cold and acquired syphilis.

The great majority of characteristics or diseases lie somewhere between these two extremes, with the relative influence varying with the individual case. In this group, one must consider heredity and environment, not necessarily as competing or antagonistic forces, but as interwoven, each modifying the expression of the other and their interaction determining the presence of the characteristic or disease.

In much of dental research, the constitutional factor has been assumed to be a homogeneous one. It has, on occasion, been referred to as a possible contributing factor, but one which did not encourage investigation. Both of these assumptions are erroneous. Too many investigators have the entirely wrong conception that only those anomalies are hereditary which manifest themselves in both parents and offspring. Too frequently, heredity has been dismissed as a factor because of variances in characteristics among children in the same family. This misconception has, in many instances, deprived an otherwise well-conceived investigation of its deserved logical conclusion and hence reduced its value as a contribution to research. In my opinion, lack of knowledge and application of genetic principles, more than any other one factor, has prevented a logical interpretation of environmental studies in caries.

It is not proposed to discuss here the principles of heredity. That has been well done by numerous geneticists.[1-6] It should be stated that, while the fundamental laws of heredity are simple and orderly, at the present time they are known to embrace at least a dozen identifiable major kinds of hereditary trans-

1. Morgan, T. H.: Evolution and Genetics. Princeton University Press, 1925.
2. Walter, H. E.: Genetics. New York: Macmillan Co., 1938.
3. Hogben, L. T.: Nature and Nurture. New York: W. W. Norton & Co., 1933.
4. McDowell, S. A.: Biology and Mankind. New York: Macmillan Co., 1931.
5. Sinnott, E. W., and Dunn, L. C.: Principles of Genetics. New York: McGraw-Hill Book Co., 1925.
6. Mohr, O. L.: Heredity and Disease. New York: W. W. Norton & Co., 1934.

mission. Combinations of these and their interactions with the environment increase that number. Clinical observation by the dentist and cursory examination of statistics by the biometrist are enough to convince one that heredity does not operate alone as a single causative factor in caries. The environmental factors are obviously involved, and no attempt to minimize them is intended. By the same observations, one is also convinced that the underlying mechanism responsible for natural immunity to caries involves something more than environmental conditions.

Among those factors in individual susceptibility to caries is the occurrence of defects in tooth structure. Increasing numbers of these have recently been shown to be of hereditary origin. Amelogenesis imperfecta hereditaria involving both enamel hypoplasia and enamel hypocalcification has been clearly demonstrated by Weinmann, Svoboda and Woods.[7] Brown hypoplasia of enamel has been shown by Finn[8] to be due to a conditional dominant gene with sex-linked tendencies. Family histories showing enamel aplasia have been demonstrated by Olson,[9] Hopewell-Smith[10] and Almquist.[11] Dentinogenesis imperfecta hereditaria has been reported by several investigators. Finn[8] has presented a well-documented study of opalescent dentin. In a study of forty-one families involving 101 generations, there was evidence of the presence of a conditional dominant gene. Keeler[12] and Roberts and Schour[13] have reported cases of hereditary opalescent dentin which show agreement with Finn's[8] observations. Wilson and Steinbrecher[14] and Noyes[15] have also reported individual cases of hereditary hypoplasia of dentin.

In consideration of this information, one is impressed with the fact that by far the majority of caries-susceptible individuals show no gross pre-carious tooth defects that are clinically observable as such, except pits and fissures. The foregoing does strongly suggest the possibility of a hereditary histogenesis of certain morphologic defects which, though microscopic, may provide a susceptibility to those environmental factors which are operative in the caries process.

Walker and Kugelmass[16] report observations which suggest a hereditary factor in caries susceptibility. Studies at the University of Michigan and Indiana University in 1926 and 1928 showed a tendency to constant or recurrent caries in certain families. The latter observations, while suggestive of hereditary forces involved in caries, are so limited that they must be considered inconclusive. The observant dentist in a family-type practice is continually aware of an individual or a family tendency to resist or to be susceptible to caries. He is impressed with the fact that, in many instances, the hereditary forces involved are so closely interwoven with environmental influences that a critical analysis

7. Weinmann, J. P.; Svoboda, J. F., and Woods, R. W.: Hereditary Disturbances of Enamel Formation and Calcification. J.A.D.A. 32:397, April 1, 1945.

8. Finn, S. B.: Heredity of Opalescent Dentin. J.A.D.A. 25:1240, August 1938.

9. Olson, J. J.: Hereditary Aplasia of Enamel. J.A.D.A. 25:830, May 1938.

10. Hopewell-Smith, Arthur: Studies in the Jaws in Health and Disease. D. Cosmos 55:765, August 1913.

11. Almquist, A. L.: Aplasia of Crown of Tooth; Hereditary Hypoplasia of Enamel. J.A.D.A. 31:1456, November 1, 1944.

12. Keeler, C. E.: Heredity in Dentistry. D. Cosmos 77:1147, December 1935.

13. Roberts, E., and Schour, Isaac: Hereditary Opalescent Dentine, Dentino Genesis Imperfecta. Am. J. Orthodontics 25:267, March 1939.

14. Wilson, G. W., and Steinbrecher, Matilda: Hereditary Hypoplasia of the Dentin. J.A.D.A. 16:866, May 1929.

15. Noyes, H. B.: Hereditary Anomaly in Structure of Dentine. J. D. Res. 15:154, 1936.

16. Kugelmass, I. N.: Dental Caries in Children: Clinical Control. New York State J. Med. 37:1733, October 15, 1937.

of one is not possible without an evaluation of the other. To pursue a study of heredity alone would be to reduce its value to that of academic interest only. A knowledge of the hereditary forces concerned in caries becomes of immediate and practical value in that its evaluation is imperative before the superimposed environmental influences can be brought into sharper focus and evaluated. It is only through the somatic modification of predisposing hereditary factors and through the recognition, evaluation and control of the superimposed environmental influences that prevention of dental caries can be anticipated.

In caries research, attention has been focused almost exclusively on environmental factors, as possible causative agents and as conditions that may influence resistance. It is not proposed here to review all of this work, much of which is well conceived and painstakingly pursued. It seems advisable to mention some that have affected the rationale advanced in this paper.

As early as 1887, Miller[17] and Black[18] suggested that caries resulted from carbohydrate fermentation. Both they and their followers have produced much evidence in support of this theory. Gore[19] is not alone in stating that Miller's carbohydrate food impaction theory does not account for individual susceptibility. Many filthy mouths having no prophylactic care whatever show immunity to caries, while many scrupulously clean mouths receiving excellent care show rampant caries. Jay and others[20] have reported a 90 per cent reduction in caries by elimination of free sugar. Clinically, while a high sugar diet in many patients appears to be followed by a high caries incidence, it is also possible to note occasional caries-free individuals on a high sugar diet and, conversely, a high caries index on a comparatively sugar-free diet. Becks, Jensen and Millarr[21] note that "occasional observations were made to the effect that some individuals consume large amounts of sugars without developing decay and others on a low sugar consumption develop rampant caries." Bunting[22] and Jay[20] have emphasized the relationship between a high *Lactobacillus acidophilus* index and caries. Becks, Jensen and Millarr, in a continuation of Bunting's and Jay's work, show a high correlation between *L. acidophilus* indices and caries. Yet in a group of 1,250 rampant caries cases, 12.3 per cent had *L. acidophilus* indices of less than 1,000. The similar picture in 265 caries-free individuals showed that 17.7 per cent had indices over 1,000. Kesel,[23] in correlating caries and the *L. acidophilus* index, found ". . . there was complete or partial agreement in 85 per cent of the cases according to this method of assignment. In seven, or 14 per cent, of the cases, the tests and clinical conditions were in disagreement."

Jones,[24] in Hawaii, and Boyd and Drain[25] reported success in controlling

17. Miller, W. D.: Micro-Organisms of Human Mouth. Philadelphia: S. S. White Dental Mfg. Co., 1890.

18. Black, G. V.: Tr. Illinois D. Soc., 1886, p. 180.

19. Gore, J. R.: Individual Susceptibility to Dental Caries. J.A.D.A. 30:1018, July 1, 1943.

20. Jay, Philip; Hadley, Faith P., and Bunting, R. W.: Observations on Relationship of Lactobacillus Acidophilus to Dental Caries in Children During Experimental Feeding of Candy. J.A.D.A. 23:846, May 1936.

21. Becks, Hermann; Jensen, A. L., and Millarr, C. B.: Rampant Dental Caries: Prevention and Prognosis. J.A.D.A. 31:1189, September 1, 1944.

22. Jay, Philip; Crowley, Mary, and Bunting, R. W.: Preliminary Studies on Immunology of Dental Caries. J.A.D.A. 19:265, February 1932.

23. Kesel, R. G.: Dental Caries: Etiology, Control and Activity Tests. J.A.D.A. 30: 25, January 1, 1943.

24. Jones, Martha R.: Our Changing Concept of an Adequate Diet in Relation to Dental Disease. D. Cosmos 77:651, July 1935.

25. Boyd, J. D., and Drain, C. L.: Arrest of Dental Caries in Childhood. J.A.M.A. 90: 1867, June 9, 1928.

caries by a diet low in starches, which produces an alkaline ash. Willis and Forbes[26] reported that an increase in alkaline content and acid neutralizing power of saliva can be produced by alkaline diet. Marshall,[27] Karshan,[28] Trimble[29] and Fosdick[30] have further studied the correlation between saliva changes and susceptibility. This saliva-caries correlation is further strongly suggested by the presence of rampant caries in cases of xerostomia (Gottlieb). May Mellanby,[31] Hanke,[32] Boyd, Price[33] and others have pointed to calcium, phosphorus and certain vitamins as factors in caries resistance. Rosebury[34] observes: ". . . in view of what has been said, it may appear paradoxical that a mitigating or retarding effect on caries can be exerted by certain dietary conditions, but the fact remains true. The inference regarding this effect furthermore is that it is constitutional or metabolic rather than direct or environmental, but its mechanism has not been satisfactorily explained."

Recently, fluorine has been projected into the foreground as a possible factor in caries resistance. Dean,[35] Armstrong,[36] Brekhus,[37] Bull,[38] Bibby,[39] Arnold[40] and others have contributed evidence. In reviewing the literature on fluorine and in considering the claimed reduction of caries in regions where water is of high fluorine content, one is confronted by many questions as yet unanswered. How can the fact that, in the same family in an endemic region, one can find two children, one caries-free and the other with rampant caries, be explained? How does one account for the caries-free condition of an individual in an area free of fluorine? Bull says:

> Fluorine cannot be looked upon as a panacea of all dental caries although the average child reared on water containing fluorine has a considerable degree of caries immunity. Many get very little fluorine and often get objectionable mottling from drinking water containing it. This is best shown in children in one family in which one has considerable mottling of the enamel and several carious teeth while another has no mottling of the enamel and no caries experience or vice versa.

Then, too, aberrant ratios have been found which have not been explained. In Green Bay, Wis., Bull found that of

26. Willis, J. H., and Forbes, J. C.: Dietary Effects Upon the Acid Neutralizing Power of the Saliva. J. D. Res. 18:409, October 1939.

27. Marshall, J. A.: Pac. D. Gaz. 23:335, June 1915.

28. Karshan, Maxwell: Factors in Human Saliva Correlated with the Presence and Activity of Dental Caries. J. D. Res. 15:383, December 1936.

29. Trimble, H. C.; Etherington, J. C., and Losch, P. K.: J. D. Res. 17:299, August 1938.

30. Fosdick, L. S., and Campaigne, E. E.: Some Chemical Differences Between Saliva of Caries-Immune and That of Caries-Susceptible Patients. J.A.D.A. 26:954, June 1939.

31. Mellanby, May: British Medical Research Council Special Reports, Series 140, Part 1, 1929.

32. Hanke, M. T.: Diet and Dental Health. University of Chicago Press, 1933.

33. Price, W. A.: Nutrition and Physical Degeneration. New York: Paul B. Hoeber, Inc., 1939.

34. Rosebury, Theodor: Dental Science and Dental Art. Philadelphia: Lea & Febiger, 1938.

35. Dean, H. T.: Post-war Implications of Fluorine and Dental Health: Epidemiological Aspects. Am. J. Pub. Health 34:133, February 1944.

36. Armstrong, W. D., and Brekhus, P. J.: Possible Relationship Between the Fluorine Content of Enamel and Resistance to Dental Caries. J. D. Res. 17:393, October 1938.

37. Brekhus, P. J., and Armstrong, W. D.: Chemical Constitution of Enamel and Dentin: Principal Components. J. Biol. Chem. 120: 677, September 1937.

38. Bull, F. A.: Role of Fluorine in Dental Health. J.A.D.A. 30:1206, April 1943.

39. Bibby, B. G.: Use of Fluorine in Prevention of Dental Caries. J.A.D.A. 31:228, February 1, 1944.

40. Arnold, Jr., F. A.: Role of Fluorides in Preventive Dentistry. J.A.D.A. 30:499, April 1, 1943.

1,647 children, approximately 1,219 showed mottling of the enamel varying from mild to severe, whereas 428 showed no fluorosis at all. In Aurora, Ill., Arnold found that "the incidence of dental fluorosis in 633 cases was 15 per cent."

This brief review of selected findings is not for the purpose of discrediting them, for they are a necessary component of the whole approach to the caries problem; but, in reviewing this literature, one is confronted with the fact that nearly as constant as the prevalence of caries itself is the variance in individual susceptibility under conditions that are not sufficiently dissimilar to account for that variance. To one interested in genetics, much of these data follow a familiar pattern; that is, the pattern of aberrant ratios as influenced by hereditary variations in response to environmental influences.

This environmental avenue of approach is not without considerable justification. It has had satisfactory results in the approach to other problems of pathology, particularly where the genetic factor for susceptibility is homogeneous or nearly so and where the environmental cause has proved to be a simple factor awaiting isolation and identification, as in the case of certain infectious and nutritional diseases. In the interpretation of etiology wherein heredity and environment are so intricately interwoven as in caries, a knowledge of environmental factors involved is necessary in analyzing heredity and, conversely, the hereditary possibilities must be understood before the superimposed environmental factors can be evaluated.

This emphasis is understandable, too, from a historical standpoint. Hippocrates, in 400 B. C., was among the first to recognize individual differences in diseases. His influence predominated until Pasteur's era. Since this time, the bacterial or external environmental factor has dominated the thinking in research. The host-bacteria relationship, while repeatedly mentioned, has not been appreciated in its full meaning.

It is almost trite to repeat that "the pathogenicity depends on the virulence of the organism and the resistance of the individual," but it is with the latter, the problem of the individual resistance factor, that this paper is concerned. The study of environmental factors in resistance has been mentioned, but the possibility of hereditary variances in resistance and susceptibility in caries has been relatively ignored.

Snyder[41] says:

> No one is justified on his own responsibility in saying that a given trait is or is not conditioned by hereditary factors unless (1) he is thoroughly familiar with the known kinds of heredity behavior, (2) he is familiar with the condition under discussion in all its varying manifestations and (3) he has carefully analyzed the condition in a scientific manner and from a genetic standpoint.

It becomes necessary then to determine whether this influence is a leading or a subordinate one, to estimate its precise intensity and to disentangle its effectiveness from and in relation to a host of interacting environmental conditions. These problems have been shown to require delicate statistical treatment.

Before it is possible to analyze the prevalence of caries, it is necessary to determine whether the process is a homogeneous one, or whether, through lack of critical discrimination, it may represent more than one process. I, and certainly I am not alone, have been impressed with the apparent clinical variances in human caries. Cementum or root caries behaves somewhat differently from enamel caries. "Pit and fissure" caries differs considerably from both interproximal and cervical caries, not only in its clinical appearance, but also in its

41. Snyder, L. H.: Medical Genetics. Duke University Press, 1941.

age of onset and in the variance of susceptibility of individual patients to one or all of these types.

Recently, Gottlieb,[42, 43] after some quite extensive microscopic studies, contributed a new concept of caries which stresses the variance within the caries process. In discussing this, he concludes:

> . . . thus we have two kinds of undermining dentine caries corresponding to the two supposed groups of micro-organisms which cooperate in producing caries. The main group producing caries proper, characterized by yellow pigmentation, is apparently a proteolytic one . . . the second group is an acidogenic one . . . these two components are not present in all cases in the same proportion. Their location also varies considerably. Different groups of micro-organisms are apparently responsible for both components.

The proteolytic group have their entrance through enamel lamellae, which are likely to vary considerably with the individual. The acidogenic group, on the other hand, progress along the prism-sheaths, even in thick enamel. With this new concept of multiform caries, one must consider not only the variance in micro-organisms or other environmental factors responsible for each, but also the variance in factors determining resistance, e.g., the structural differences which permit or preclude the action of these forces. Individual enamel variances and defects such as enamel lamellae and prism-sheaths then become a matter of interest to the geneticist as well as to the anatomist.

It is quite possible for two or more hereditary processes, as well as environmental processes, to produce what, on superficial observation, appears to be a common characteristic, but, on more detailed examination, proves to be two or more pathologic conditions with a somewhat similar clinical expression. This is true in other parts of the body. For example, optic myopia had been conceded for some time to be caused by hereditary forces. It was with some surprise that biometric methods showed a dominant gene responsible for excessive curvature of the cornea, producing myopia; and a recessive gene responsible for excessive lengthening of the globe, also producing myopia. It would seem obvious that a critical discrimination regarding possible variances in caries is necessary. In the future, a study of caries locus in connection with environmental and hereditary studies is required and the results may yield reciprocal information which is necessary to each. It is to be appreciated that this is not without its problems.

There are two methods of approach to the caries problem on a genetic basis: first, the experimental approach by use of laboratory animals; second, the biometric method, the analysis of data on human statistics. Each procedure, while having its problem and limitations, may supplement the other in the analysis of the caries problem.

The experimental method has been employed to a limited degree. Hunt and Hoppert[44] have recently reported preliminary results in breeding a strain of rats showing decreasing caries susceptibility. They suggest that a "caries immune strain might be developed." The experimental method is advantageous in that the investigator is able to breed his material at will. Multiple variations are possible, many of which may provide suggestions for consideration in human caries. There is a definite limit to this method. While differences in human

42. Gottlieb, Bernhard: J. D. Res. 22:185, June 1943.

43. Gottlieb, Bernhard: New Concept of Caries Problem and Its Clinical Application. Part I. J.A.D.A. 31:1489, November 1; Part II. 31:1598, December 1, 1944.

44. Hunt, H. R., and Hoppert, F. A.: Inheritance of Susceptibility and Resistance to Caries in Albino Rats. J. Am. Coll. Dentists 11:33, March 1944.

caries diagnosis have only recently been brought to light, it has been evident for some time that the term "caries" has been loosely applied to animal tooth destruction. Hoppert, Webber and Canniff,[45] Rosebury[46] and Bibby and Sedwick[47] have concurred in this observation that:

. . . studies of so-called "caries" in rat molars show that the observations with few exceptions have not been made carefully and there is ample reason to doubt that this process of tooth destruction resembles caries in man. The explanation is offered that the peculiar normal morphology of these teeth permits them to be easily fractured by forces from the occlusal surfaces. Development of such fractures is promoted by the presence in the diet of coarse hard particles. It is suggested that, heretofore, fracture lesions have been confused with caries, although the conditions resemble each other only in their late stages.

Then too, while human variances in enamel are obvious, rat-human contrasts are more so. Animal nutritional and metabolic processes show still further variance. The question arises, then, as to whether the assumption of rat-human caries similarity is a valid one. This is not intended to minimize the need for animal experimentation. On the contrary, it should be increased, but on a genetic basis, using only homozygous strains as controls and in a consideration of a more critical diagnosis of the caries process itself.

Biometric methods, excluding a small number of twin studies, have never been applied to caries research. This is probably because those most interested in dental caries have not been aware of genetic principles and progress in biometric procedures. Snyder, in referring to these biometric methods, says:

Improvements in methods of investigation have resulted in bringing a wide range of seemingly inexplicable phenomena under a unified set of hereditary laws which while considerably more extensive and inclusive than Mendel's original laws are fundamentally simple and orderly. Ratios of the sort found in animals are not observable as such in man. No single family is large enough as a rule to provide a valid ratio in any generation. When groups of families are lumped together for analysis, aberrant ratios are obtained because it is usually impossible to separate homozygous parents from the heterozygous parents. This leads to a radically different type of analysis of human pedigrees, the study of the frequency of factors involved.

Biometrics, that phase of genetics which is concerned with the collection of statistical data regarding the occurrence of human characteristics for purposes of studying the hereditary influences involved, has three methods of approach.

The first method is the process of random sampling, the study of mass statistics to determine the rate of occurrence of a characteristic in a given population. This method has been followed somewhat closely in a statistical study of environmental factors in caries. From the hereditary viewpoint, it will not yield specific results because the interwoven complexity of the involved environmental factors confuses the picture.

The second method is the study of family histories and pedigrees, which has remained almost untouched in caries research. It is adaptable not only to the study of susceptibility to caries itself, but also to a study of the component factors involved. Included in this method is the consideration of a hereditary diathesis or disposition which is operative only in selective environments. That this may involve calcified ectodermal tissue is indicated by the occurrence of onychogryposis, a peculiar hornlike cor-

45. Hoppert, C. A., Webber, P. A., and Canniff, R. L.: Production of Dental Caries in Rats Fed an Adequate Diet. J. D. Res. 12:151, February 1932.

46. Rosebury, Theodor: J. D. Res. 18:343, June 1943.

47. Bibby, B. G., and Sedwick, H. J.: Formation of Cavities in Molar Teeth of Rats. J. D. Res. 13:429, December 1933.

nification of the nails which follows a definite pattern and is expressed only in certain susceptible families and in such individuals as suffer the superimposed trauma of shoe-wearing.

The third method is the study of monozygotic twins, a method especially adapted to the caries problem. Newman[48-50] defines monozygotic twins as those which "arise from the dichotomy of the bilateral primordia of a single embryonic axis into two equal and coeval parts, each destined to become a new individual, neither the one or the other being construed as representing the original intention." He continues: "The resemblance is both quantitative and qualitative in nature, the parallelism involving both chronological age and hereditary environment." Inasmuch as these twins arise from the fertilization of one ovum by a single sperm, they may be regarded genetically as one biologic individual in two parts. Their genotype being identical, their resemblant phenotype has resulted in their sometimes being called identical twins. These are to be differentiated from dizygotic or fraternal twins, which result from the fertilization of two ova. These resultant genotypes are no more similar than those of ordinary siblings. Differential diagnosis was discussed first by Galton,[51] then by Siemens, Newman, von Vershuer and Dahlberg. Siemens[6] has developed a "polysomatic diagnosis of similarity," which is a "reliable basis of twin classification based on sex, blood groups, papillary patterns, types of hair, eyebrows, nose, lip, ears, furrowing of tongue, skin vessels, as well as anthropological measurements and psychological tests." The reliability of this diagnosis is verified by the fact that Schiff and von Vershuer, each unaware of the other's investigation, concurred in their diagnosis in a study of a group of 202 cases.

Galton, in 1883, first suggested that the study of monozygotic twins as contrasted with dizygotics would produce a method of differentiating between heredity and environmental influences. The experimental approach as described by Hirsch[52] consists of two parts: (1) contrasting data on dizygotic twins living in similar conditions with data from monozygotic twins living in similar conditions, the difference discovered being interpreted as almost wholly due to heredity, and (2) contrasting data from monozygotic twins living in dissimilar environments, any greater differences being largely attributed to environmental conditions.

This method provides the only possibility of controlled study in human biology. Here, one can observe the effect of varying influences on two genetically identical individuals. Lange, Luxemberger, Rosanoff, Handy, Brush and others have used this method with excellent results in studying conditions as elusive as schizophrenic psychoses. That this method offers logical and empiric possibilities is further evidenced by the fact that recently, inspired by both observational studies and experimental breeding of rats, a nationwide program has been organized to pursue a biometric study of cancer on a large scale.

In caries research, twin studies in a somewhat limited manner have been used by Bachrach and Young and Goldberg.[53] Their results were contradictory

48. Newman, H. H.: Biology of Twins. University of Chicago Press, 1917.

49. Newman, H. H.: Physiology of Twinning. University of Chicago Press, 1923.

50. Newman, H. H.: Studies of Human Twins. Methods of Diagnosing Monozygotic and Dizygotic Twins. Biol. Bull. 55:283, October 1928.

51. Galton, Francis: Inquiries into Human Faculty and Its Development. London, 1883.

52. Hirsch, N. D. M.: Twins. Boston: Harvard University Press, 1930.

53. Goldberg, Samuel: Biometrics of Identical Twins from Dental Viewpoint. J. D. Res. 9:363, June 1929.

and must be considered inconclusive because of their narrow scope and concept. Among other things, no allowance was made for the consideration of a hereditary diathesis. Brucker[54] reported a well organized study of six pairs of monozygotic twins. His results show that "definite tendencies to co-resemblance and cross-resemblances were manifested in the dentition." Biometric studies in caries in their broader concept have never been reported.

The need is for analysis of the problem on a large scale. Twins occur in one out of every eighty-eight births and, of these, one out of every four is monozygotic, which presents a minimum of several hundred thousand subjects of varying age for study. In contrast to the analysis of psychoses, dental caries presents an obvious and visible means of recognition. For microscopic study, one cannot imagine a more commonly found biopsy material than the extracted tooth. These facts serve only to encourage the recognition of the possibilities of this approach. Therefore, a plan is suggested whereby this study of heredity and environment may be carried out, not only with a purpose of studying heredity, but also with the purpose of evaluating the environmental factors involved.

This cannot be done by a continuation of present methods with their lack of coordination and the haphazard reporting of small numbers of isolated and disconnected, localized investigations. A disease as common as dental caries, involving the greater majority of human beings, and which has defied investigation as to its detailed etiology, merits the consideration of a large scale correlated study, not to be inconvenienced by limitations, geographic or otherwise. Biometric research necessitates going into the field for material wherever it is to be found. This research organization then must be of such nature as to allow nationwide investigation. One cannot imagine this being done successfully without the assistance of the Public Health Department and the Census Bureau. It will require a critical analysis of caries by qualified dentists working in collaboration with biometrically trained geneticists, assisted by anatomists, biochemists, physiologists, pathologists and nutritionists. Several fields of investigation await study:

1. The analysis of caries incidence and behavior.

Method: (a) Studies of large numbers of monozygotic, dizygotic, concordance-discordance ratios.

(b) Studies of caries-free individuals in high caries areas and caries-positive individuals in low caries areas in order to determine the possibility of evolving family pedigrees.

2. Genetic studies in these individuals of tooth morphology, particularly of the enamel, its lamellae and transparent areas and their relationship to caries.

Method: (a) Study of monozygotic-dizygotic twin differences.

(b) Family histories. Biopsy material will doubtless be ample in the high caries cases. The caries-free cases will yield some teeth extracted for periodontal reasons. This will not be possible in every case and will dictate the need for further investigation until sufficient material is found.

3. Genetic studies on the same individuals of local systemic factors which may influence teeth, such as saliva and endocrines. Correlated studies of the biochemistry, physiology, pathology and nutrition to provide the environmental data are needed to permit an interpretation and evaluation of the hereditary and environmental findings.

4. The study of the possibility of

54. Brucker, W. H.: Influence of Heredity and Environment on Caries Pictures of Monozygotic Twins. J.A.D.A. 31:931, July 1, 1944.

hereditary diatheses as they may affect both (2) and (3). This can be done by a study of family pedigrees and a logical interpretation of monozygotic-dizygotic studies.

I have been impressed by the aberrant ratios obtained by numerous investigators in studying the caries index under various environmental conditions. The possibility of a hereditary diathesis which might account for the expression of certain dental characteristics in certain individuals in specific environments is suggested. If a multiform caries process exists, two or more diatheses may operate, as may environmental diatheses. At any rate, a careful analysis of this possibility is required to determine the exact role played by the individual environmental factor in each case. Multiple possibilities for study, including fluorine, which is currently under discussion, immediately suggest themselves. Until now, the method used in presenting statistics on this problem justifies neither its acceptance nor its denial. Group statistics, particularly when inconsistent, do not reveal the behavior in the individual case, which, after all, is the crux of the problem.

Fluorine, to be properly evaluated, should be studied through the caries experience of monozygotic twins of all ages living both together and apart, in and out of endemic areas, and through studies of caries-free family histories in and out of endemic areas. Endemic fluorosis, too, strongly suggests an hereditary diathesis. This is further suggested by the diathesis of another halogen, iodine. Davenport, in investigating the individual susceptibility of patients with endemic goiter in iodine-free areas, noted that the characteristic was expressed in certain families.[55] As a result of some well documented studies of family histories, he postulates that:

> Endemic goiter appears in regions which are endemic for iodine deficiency, but only in certain individuals whose susceptibility is determined by the combined presence and interaction of two genes, one a sex-linked dominant probably involving a hormone and the other a dominant autosomal gene responsible for some imperfection in the structure or function of the thyroid gland.

5. Controlled study. In caries studies, the presence of so many interacting hereditary and environmental influences tends to cloud the analysis of any one factor. Perhaps the greatest variable is the human constitutional factor. Monozygotic twins, then, offer a unique possibility for a modified controlled study. In such twins, the genetic factor being constant, a new field of investigation is opened, then, on the variance of caries index on monozygotic twins separated at varying ages and under varying influences.

To pursue this further, the possibility arises of studying monozygotic twins in an endemic area. Here, the additional common endemic factor, also a constant, provides an opportunity for a qualitative analysis of other factors.

It would be presumptuous to attempt to predict every possibility of investigation in this new field. Empiricism may well provide new pursuits and new methods of approach to supersede those suggested here. Also, this observer is well aware of the difficulties in approaching this problem and does not pretend to believe that this method can have results without time-consuming, delicate, statistical analysis, close coordination of the associated fields mentioned, an exchange of biologic opinion and, by no means least, laborious effort and logical reasoning. In conclusion, one must repeat that the justification for such a plan of heredity study lies in its absolute neces-

55. Davenport, C. B.: Genetical Factor in Endemic Goiter. Carnegie Institute of Washington, 1932.

sity before the environmental factors involved in caries can be understood and evaluated. Recognition and control of these environmental factors in turn must precede any hope of caries prevention. It is axiomatic that empiric methods will be successful only when they are fundamentally in accord with natural laws.

29 Commonwealth Avenue.

THE PORCELAIN-ACRYLIC JACKET CROWN

George C. Porteous, D.D.S., and Willard T. Vondran,† Farragut, Idaho*

The porcelain jacket crown has, for years, been considered the finest restoration medium for broken-down teeth. Porcelain has a high resistance to direct force, but low resistance to impact force and to torque. This has limited its use.

Acrylic resin, with its introduction for use in crowns and inlays, met with enthusiastic acceptance by many men who hoped that it had all the fine qualities of porcelain, plus high resistance to impact force. Possibly another reason was the greater ease in construction that it promised. At first, many of the undesirable qualities of acrylic resin were overlooked because the operator was sure that restorations with this material would not break down.

It is not necessary to discuss the physical properties of porcelain and acrylic resin, as they are well known. The main objection to the use of an acrylic jacket is its creep and cold flow. This, plus its elasticity, seems to lead to breaking of the cementing medium.

At the U. S. Naval Training Center, Farragut, Idaho, a number of broken porcelain jacket crowns and loose acrylic jacket crowns were observed. Questioning of the patients usually revealed that the porcelain jacket was fractured by impact force. The defective acrylic jacket would come off the tooth or the tooth was hypersensitive and it was found that the cementing medium was broken.

These facts caused us to construct a crown combining the two materials, a porcelain core with an acrylic veneer. We hoped thus to combine the best qualities of the two materials, with the result that this porcelain-acrylic crown would overcome the objections to the use of either material separately. This technic is by no means a short cut to successful restorations. In fact, it requires more work than a porcelain jacket crown and its construction is just as exacting. The fundamentals of good tooth preparation cannot be overemphasized. This is very well discussed by Sayre.[1]

After preparation of the tooth, construction of the crown is as follows:

1. A tube impression is taken either in compound or in elastic impression material. We have found that a copper plated die is much more satisfactory, as there never is trouble with disfigured margins during the burnishing or swaging of the platinum matrix. The root portion of the die is made of amalgam.

*Lieutenant (DC) USNR.

†Pharmacist's mate (3c) USNR.

The opinions or assertions contained in this article are the private ones of the writers and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

1. Sayre, L. D.: Physics and Mechanics Involved in Serviceable Porcelain Jacket Crown Restorations. J.A.D.A. 31:3-11, January 1, 1944.

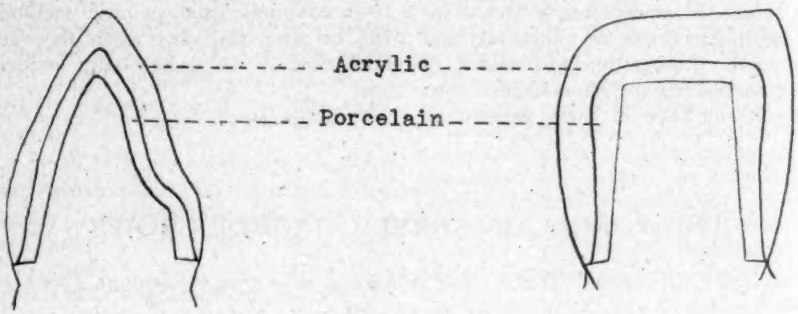

Figure 1.

The teeth adjacent to the prepared tooth in the impression are packed in amalgam. This insures accurate contact points and eliminates the possibility of breakage.

2. In adaptation of platinum matrix to the die, the tinner's joint, on the shoulder, is reduced so that there is not a space between the crown and the shoulder of the tooth when the matrix is removed. The accuracy of the platinum matrix determines how well the finished crown will fit the tooth.

3. In baking the porcelain core, the shade of porcelain is the gingival color of the tooth shade selected. For example, if the crown is to be shade 65, a mix of porcelain is used that matches the gingival color of shade 65. If the tooth is a badly discolored one, a mix of opaque porcelain can be used to blot out the discoloration, but the opaque mix will have to have the same color quality of the tooth shade or the core will cast a shadow through the acrylic and alter the appearance of the finished crown.

The thickness of the core will depend entirely on the size of the tooth. It is best to divide the thickness of the labial and the lingual surfaces so that the porcelain and acrylic over these areas are about equal. The strength of porcelain does not depend on bulk.

By referring to the diagrams (Fig. 1), it will be seen that the porcelain reproduces the shape of the resistance and retention form of the prepared cavity with two exceptions: (a) The porcelain on the shoulder of the prepared cavity is stopped just short of the finished margin. This is important because, in polishing the crown, if the porcelain extends to, or slightly beyond, the finished margin, unglazed porcelain will be in the undesirable position of contact with tissue. (b) On the mesial and distal surfaces in the region of the contact points, the porcelain is built out to a greater convexity, as is shown in Figure 1, right.

The porcelain core may be made in two firings. The porcelain is first carried to a high biscuit bake. Corrections in contour and fit can then be made by removing or adding where necessary. Then, over the whole surface, the porcelain is stippled on with a brush, and the second firing is carried to an eggshell finish. This leaves a roughened sandpaper-like surface which, with the convexity of the proximal surfaces, gives a mechanical lock of acrylic to porcelain.

The platinum matrix is left within the porcelain core until the crown is completed.

4. Acrylic jacket crown technic is followed from this point on, with one exception. The crown, when ready to be invested in the flask, is filled with crown and bridge cement. A broken bur

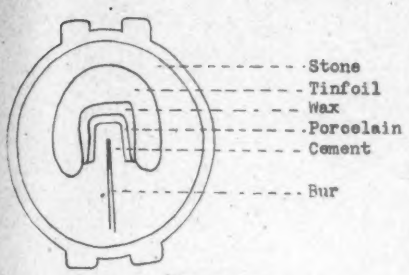

Figure 2.

or small screw nail is placed in the cement to hold the porcelain core in proper position in the stone and also to facilitate the removal of the cement from inside the crown (Fig. 2). Cement instead of stone or plaster is used inside the crown because the setting expansion of either one is great enough to check the porcelain. The case is packed ready for processing. It is important that the curing be started in cold water.

5. After processing and cooling, the crown is taken from the flask, the cement and platinum matrix are carefully removed and the crown is finished in the usual manner. If, on trying the crown in the mouth, any addition in contour or contact is necessary, wax may be added and the crown be reinvested. Packing and curing are carried out as before.

Patients for whom this type of jacket crown was made, to replace broken porcelain crowns, comment on the pleasant change from the hard shock of biting against porcelain.

Unfortunately, we cannot submit case histories of every porcelain-acrylic crown made. We have been using this technic for ten months and approximately ninety-five crowns have been made.

Of the crowns made, only one was fractured, and fracture occurred after two months. The two upper central incisors had been restored with jacket crowns. The bite was heavy, and there were spaces of 1.5 mm. between all the anterior teeth. While playing football, the patient had received a heavy blow under the chin, resulting in fracture of the crown on the upper left central incisor. Examination revealed that the acrylic veneer had fractured and separated from the porcelain core and could be removed. The porcelain was not broken. The porcelain on the lingual aspect had been made too thick in proportion to the space allowed for that part of the crown. In adjusting the occlusion, the acrylic had been ground through to the porcelain. The porcelain core was tapering in outline from the shoulder to the incisal aspect. The porcelain was glazed. These findings confirmed our ideas that we must have complete mechanical locking of the acrylic to the porcelain by contour and by a rough porcelain surface.

We submit this technic knowing that we have not sufficient clinical evidence to prove its success. Theoretically, this type of crown should be practical. We invite criticism and research upon this technic.

NORMAL FUNCTIONAL OCCLUSION: ITS IMPORTANCE IN PREVENTION AND TREATMENT OF PYORRHEA

Herbert Ward Day, D.D.S., Seattle, Wash.

Dentistry should be considered an art in the field of health. Finding a cavity and filling it is only a small part of the responsibility of a dentist. Each restoration has a definite relationship to all the rest of the teeth in the mouth. The oral cavity is a unit and functions as such. The ideal prosthesis must first fit the tooth, and with perfect margins. It is necessary also that there be proper relationship to the opposing teeth in the same arch. Contact points that are less than perfect are unsatisfactory.

We are concerned, in this discussion, with proper relationship to the opposing teeth in the opposite arch. There should be occlusion in right lateral, centric and left lateral bites during the normal excursion of the mandible in mastication. At the same time, a restoration should not interfere with the normal functions of the rest of the teeth since they must be thought of as forming a unit and not as individual teeth.

It is the purpose of this article to show how the normal functioning of teeth is conducive to health of the periodontium. We will observe, furthermore, that, if these normal functioning relationships are ignored, certain undesirable conditions may result.

In 1930, Forrest H. Orton[1] examined 2,982 students who were entering the University of California. He did not find one case in which all the buccal and lingual cusps on both sides of the arch were in ideal contact with the opposing teeth during the gliding movements of the mandible. Most of our ideas on jaw movement have been associated with denture construction and cuspal relations of dentures in the working and balancing bites. Because we seldom see a normal functioning cuspal relationship in the human denture, and because our tendency is to consider the cuspal relationship in the working and balancing bites of artificial dentures as normal for the human denture, our conception of normal, natural relationships is confused. We must stress the normal.

It is a well-established fact that, in the normal process of mastication with a bolus of food on the right side, the mandible is in a position below and to the right of the upper jaw. (Fig. 1.) The cheek and tongue feed the food into this area between the occluding surfaces of the teeth as the mandible crushes vertically and lingually from centric position. From this point to the completion of the excursion, there is a shearing action of the buccal cusps of the lower teeth against the lingual cusps of the upper teeth. At that time, the mandible opens vertically again as the inclined planes of the opposing cusps cross each other. The functions of the buccal cusps of the upper teeth and the lingual cusps of the lower teeth in this action are similar to those of the tongue and cheek in holding the food in position for grinding.

One has only to observe the mandibular actions of various individuals in order to see such action. It is impossible to teach any one to chew. There is only one way to masticate, and an attempt has just been made to describe it. Any continual interference with this natural movement of all the various forces applied in occlusion may result in disease of the supporting structure. Not only

1. Orton, F. H., and Fischer, B. E.: Relations of Human Denture. J.A.D.A. 20:1553, September 1933.

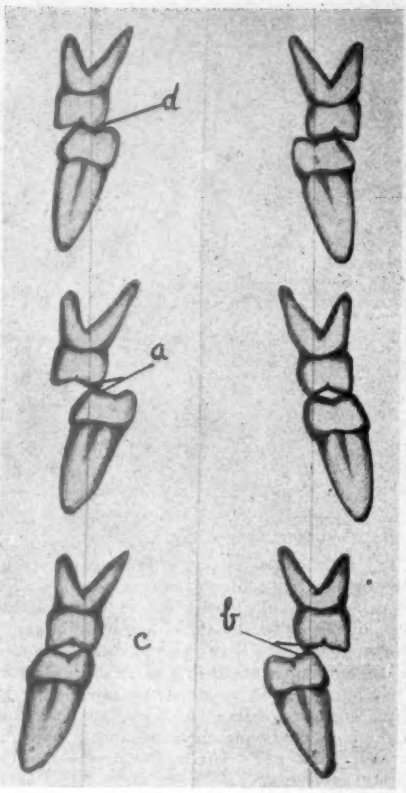

Fig. 1.—Normal functional relationships in centric (above), right lateral (center) and left lateral (below) bites. The important relationship in the right lateral bite is that of the buccal cusps of the lower tooth to the lingual cusps of the upper tooth on the left side at *a*. The vital relationship in the left lateral bite is the lingual buccal contact at *b* on the right side. It must be remembered that the forces are applied lingually and vertically on the upper tooth and buccally and vertically on the lower in masticating on that side. The normal masticating stroke begins on the left side at *c* with the jaw opened vertically and to a left lateral position with the cheek and tongue feeding the bolus of food between the cusps of the opposing arches. The mandible then crushes lingually and vertically from centric relation, at *d*, with the Bennett movement taking place just off centric position, and continues lingually with an increase in the vertical dimension and a forward movement in a shearing action to complete the stroke at *a*. This action applies to either side. This is the normal, any other method leading to varying degrees of trauma, which, in turn, may lead to pathosis.

the offenders may be traumatized, but all the teeth may be affected.

The main forces in mastication are exerted at right angles to the inclined planes of the buccal cusps of the lower arch and at right angles to the inclined planes of the lingual cusps of the upper arch. It follows, then, that the principal forces are directed lingually on the upper teeth and buccally on the lower teeth.

It is proper at this time to note nature's anatomic reinforcements, designed to withstand the forces of normal occlusion. G. V. Black, using a gnathodynamometer,[2] demonstrated that the mandible may have a crushing strength as great as 300 pounds on the first molars. The average is from 150 to 200 pounds.

Figure 2 was made from sections of a normal cadaver at the first molar region. The lingual root of the upper molar is at right angles to the buccal slope of the lingual cusps of the same tooth. There is a thin veneer-like structure of bone on the buccal surface. The bone structure supporting the lingual root in the palate has a natural curve which gives it additional strength in that direction. Obviously, from the point of view of an engineer, this upper tooth would best withstand the strongest pressure in a direction parallel to the long axis of the lingual root and at right angles to the

2. Black, G. V.: Operative Dentistry. Vol. 2. Chicago: Medico-Dental Publishing Co., 1920, p. 245.

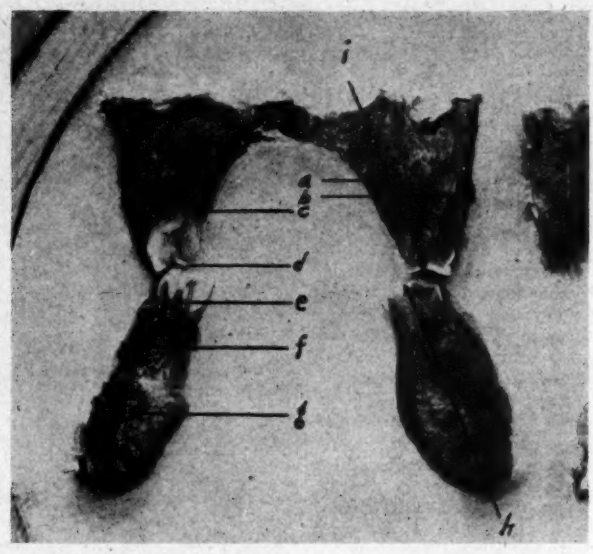

Fig. 2.—Cadaver section in first molar area, showing nature's reinforcements and direction of forces coinciding with this natural bracing. The natural curve of the palate gives a bridging effect and a bulk of bone for additional strength to forces applied lingually *(a)*. The thin layer of bone buccally shows a frail support in that direction *(b)*. The long lingual root, as compared with the short buccal root, is another factor in prevention of lingual displacement *(c)*. The slope of the buccal plane of the lingual cusp is at right angles to the lingual root *(d)*. The slope of the long axis of the lower molar is lingual *(e)*. This gives it greater resistance to displacement buccally. The buccal plate of bone is nearly equal to the lingual *(f)*. The slope of the body of the mandible is lingual, indicating about equal buccal and lingual resistance to vertical thrust *(g)*. The direction of the forces applied in chewing takes advantage of these natural reinforcements *(h* and *i)*.

Fig. 3.—Model made before and after treatment in case of woman aged 35. Treatment consisted of removing the third molars and grinding the first and second molars at the points of interference. Care was taken not to remove that part of any tooth which would function in lateral movements. The principle of applying the forces lingually on the upper and buccally on the lower teeth as in normal functional relationship is adhered to in this correction.

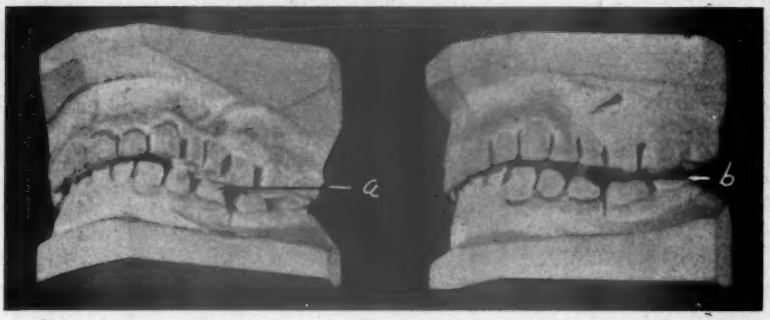

Fig. 4.—Left: Right lateral bite demonstrating lengthening of lingual cusps of upper teeth for contact at *a*. Right: Condition before treatment; showing absence of contact and of lingual cusps *(b)*. Pyorrhea had developed distally from the first molar, with considerable pain and profuse bleeding of the irritated gums.

buccal slope of the lingual cusps. Any pressure opposed to this natural reinforcement will result in disease sooner or later.

It is impossible to demonstrate that there is more support on the buccal than on the lingual aspect in any of the various mandibular sections. There is dense structure in both areas. The angle of the body of the mandible and the angle and position of the buccal cusp of the lower molar itself indicate that the strongest resistance to disturbance of normal function would be both buccal and vertical. The principles of force and leverage are well demonstrated by the fact that, distally from the first molar, the long axes of the roots are at an even greater angle to the forces applied and the bone structure is heavier buccally. These facts indicate that nature has provided the structure which will best withstand the forces of mastication lingually on the upper and buccally on the lower teeth for the normal life span of 65 years.

There are times when we must aid nature. We must make certain that the forces of occlusion are in harmony with nature's reinforcements.

There is no technic or set of rules to tell us how to achieve this normal func-

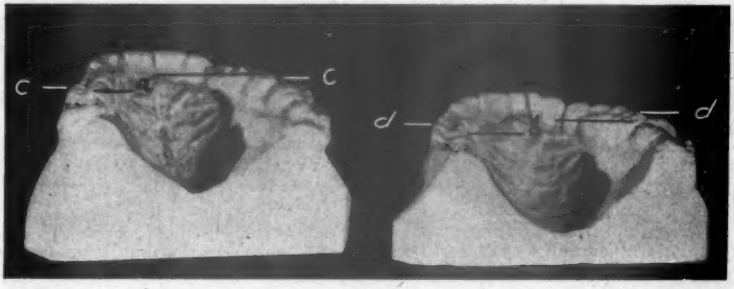

Fig. 5.—Left: Maxillary occlusal aspect after treatment. The curve of Spee is normal. Right: Model showing buccal cusps longer than lingual cusps, reverse of condition shown at left, at points *c*. The shortened buccal cusps can be seen in contrast to the lengthened ones at *d*. The lengthened lingual cusps at point *a* are in contrast to the shortened ones at point *b*.

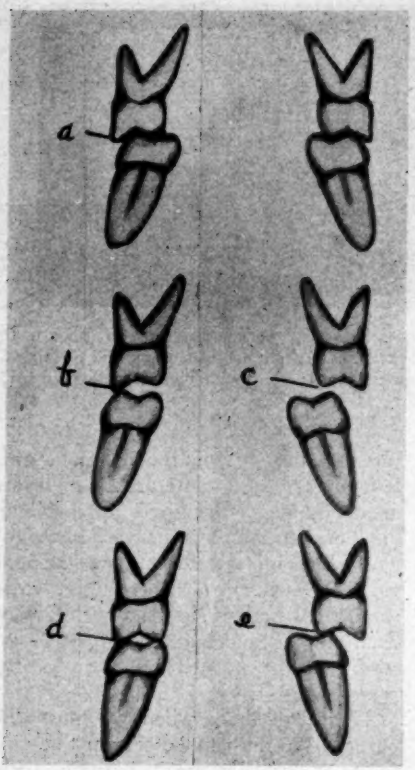

Fig. 6.—Long buccal cusps in centric relation (above) at point *a*, interfering in left lateral bite (center) at point *b*, with normal functioning on opposite side at point *c*. The functional relationship has been restored (below) at *e* by removing the long cusps at *b* to look like point *d*. Interfering points as shown at *b* would prevent any of the other teeth from functioning normally. (Compare Figs. 4 and 5.)

tional relationship. An understanding of the oral cavity and the functioning relationship to the whole is necessary. The teeth, cheeks and tongue are integral parts of the whole. Let us view the oral cavity with such an understanding and our diagnosis and prognosis will be not only right, but also lasting.

The reasons for few normal cases are multiple. There may be a combination of developmental irregularities during eruption. Wedging under the stresses of mastication can cause irregularity. Binding by the various normal and abnormal intra-oral and extra-oral forces brought into play, both functional (lips, tongue, cheeks) and habitual (extra-oral pressures, habits, etc.), lessens the possibility for healthy cuspal relation. Soft food diets prevent normal wear of cusps. Misshapen artificial prostheses restrict lateral functional movements.

The importance of functional relationships to retention in orthodontic cases is summed up in an article by McCauley[3]:

> If I were to choose any one factor as the most important one contributing to successful retention, I believe I would unhesitatingly choose "the establishing of the very best functional occlusion the case will afford" . . . and in answering what I thought constituted the most important single factor in that goal, I would suggest that the classic cuspal relation during function of upper and lower first molars was secondary to the proper cuspal relation during function of the upper and lower cuspids. Here is your goal: Get that lower cuspid to travel in its lateral swing mesial to the upper; not end to end, nor halfway. Make it mesial if you have to reshape the tooth, if you have to leave spaces between maxillary lateral incisor and cuspid, and even if you have to reshape the occlusal surfaces of the molars to adapt them to the cuspid occlusion.

In June 1943, Emery Fraser, of Seattle, Wash., read a paper at the meeting of the Northern Section of the Pacific Coast Society of Orthodontists entitled "Aims in Orthodontics"[4] in which he said:

> The lingual cusps of the upper premolars and molars should be in contact with the lingual slopes of the buccal cusps of the lower second premolars and molars. The lingual cusp functional relationship, or balancing bite, as it is termed in artificial den-

3. McCauley, D. R.: Cuspid and Its Function in Retention. Am. J. Orthodontics 30: 204, April 1944.

4. Unpublished data.

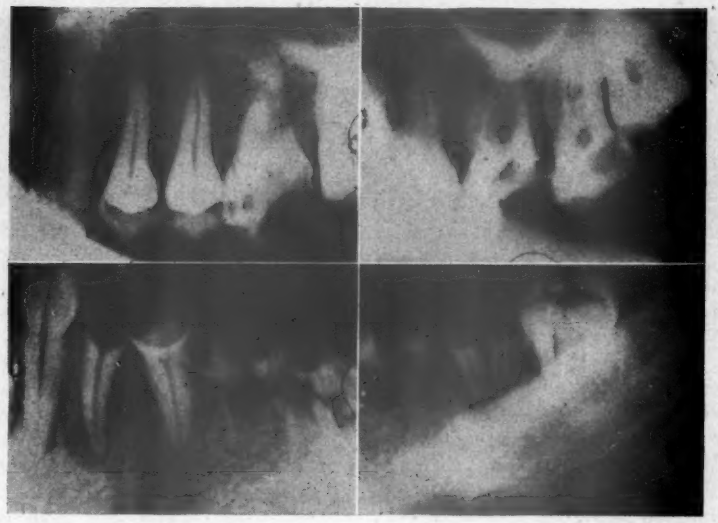

Fig. 7.—Views of right side in case shown in Figures 8 and 9; taken in 1939.

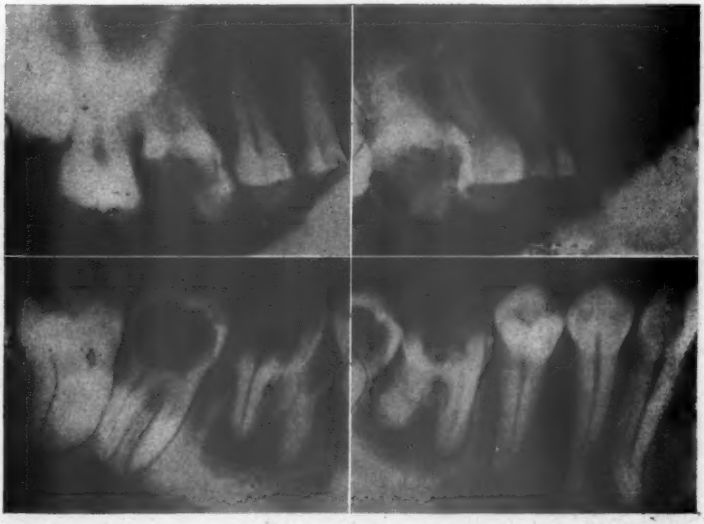

Fig. 8.—Views of left side in case shown in Figures 7 and 9; taken in 1939. **The apical infection and the poor general condition of the bone are evident. The impacted lower third molar was brought forward and put into use by orthodontic measures.**

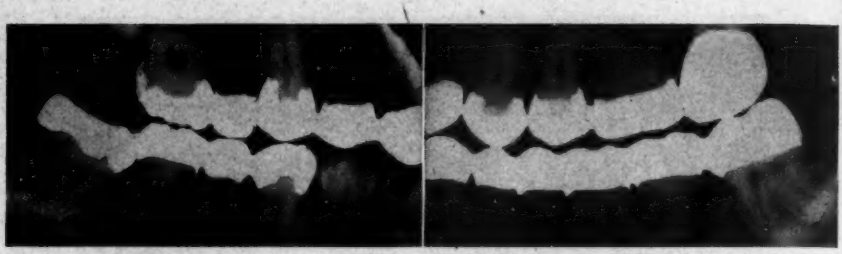

Fig. 9.—Views of case shown in Figures 7 and 8, six years after the case was completed. On comparison with the films taken six years earlier, the general improvement in bone structure is evident. The abutment teeth of the six-tooth span of the lower right side have held because the forces of mastication are in harmony with nature's reinforcements.

ture construction, is to my mind, the greatest retaining force in the buccal segments.

The cuspids were never meant to absorb shock in masticating. When the occluding surfaces of the posterior teeth are separated in the lateral excursion by the cuspids, a short chop bite results. The resultant hammering effect makes for trauma. The only mandibular action possible in such cases is similar to that found in the carnivorous animals. The temporomandibular joint is the most flexible joint in the body. It will accommodate itself to any changes to normal functional movements of the mandible.

It is not suggested that the wholesale grinding of teeth is necessary for every patient just because the teeth do not function normally. There must be an indication of bone loss. A reconstruction case may require selective grinding.

There are many cases of malocclusion with no symptoms of bone destruction. In such cases, the health is good. The

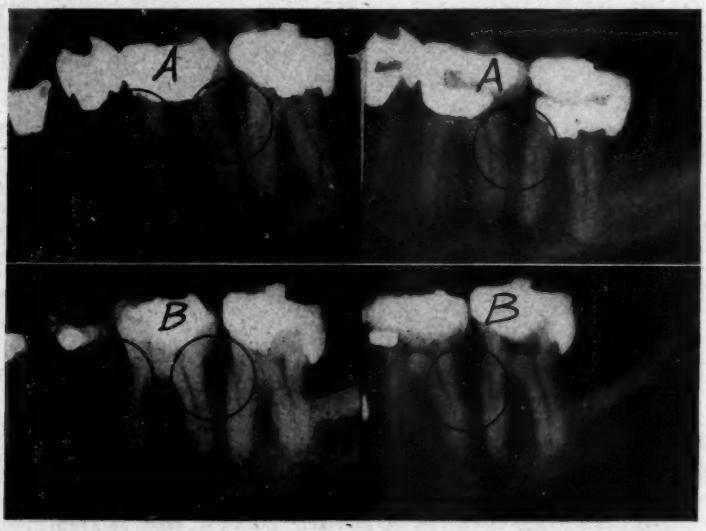

Fig. 10.—Treated case. *B*, bone structure before treatment. *A*, bone structure after four and one-half years.

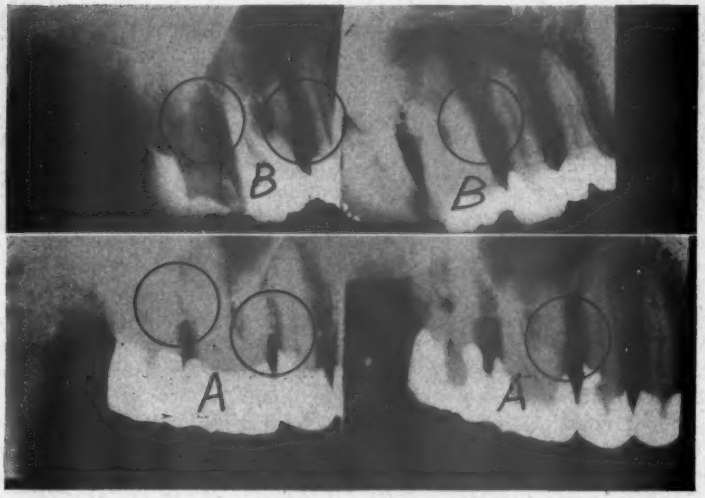

Fig. 11.—Left side of treated case. *B*, bone structure before treatment. *A*, improved bone structure twenty-one years later.

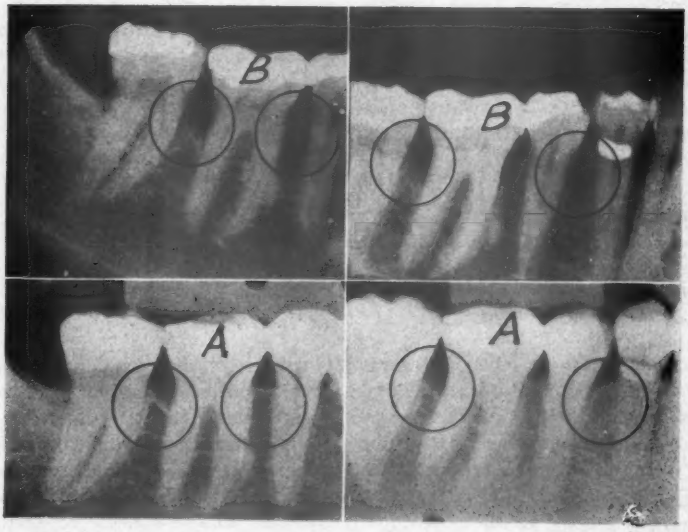

Fig. 12.—Treated case. *B*, bone structure before treatment. *A*, improved structure, two years later.

regenerative bone cells are working overtime in order to maintain the bone structure. As the patient reaches the period in life when resistance is lowered, rapid destruction of the supporting structures may be noted.

It is impossible in this paper to go into details regarding methods of attaining a normal functional relationship. This much can be said: when interference is found in the anterior region, the anterior teeth, if it is necessary to grind them out of centric occlusion, probably will not elongate while they are in function on the lateral excursions.

A cusp or a tooth that interferes with the functional relationships of all the rest of the teeth must be altered. Interfering cusps can be likened to cogs in a gear: the gears will not function if one or two long cogs interfere. Neither can the teeth function when the presence of one or two long cusps prevents normal occlusion. Cavities will not develop in these altered spots because they are self-cleansing. It follows that we may save all of the teeth and maintain a healthy periodontium by losing a small part of certain teeth.

For example, in one case (Fig. 3), the patient had not been able to occlude the teeth even in centric relation. As a result, the lip muscles had enlarged and been strengthened because she was incising with the lips to a point of deformity. An extra burden had been given the stomach, resulting in digestive disorders. The gums in the second molar area were red and inflamed, and the bone was beginning to break down. This extreme case of poor tooth relations shows clearly the various ramifications of malocclusion. The relationship of the oral cavity to the rest of the body must always be considered. Similarly, teeth must be considered in relation to the rest of the teeth. They must function normally in order to remain in a healthy condition.

Another example of poor tooth relationship is shown in Figures 4 and 5. The method of attaining optimum intermaxillary relationship for this case is shown in Figures 4, 5 and 6.

The evidence of bone improvement is shown by x-ray film taken before and after treatment. (Figs. 7 to 12.) The treatment of these cases was as follows: Normal function was the goal. Stresses were applied lingually on the upper teeth and buccally on the lower teeth as has been demonstrated in the sketches and in the before and after models. This treatment was accompanied by routine prophylactic work in all cases.

827 Medical & Dental Building.

PSYCHOLOGIC PROBLEMS ASSOCIATED WITH COMPLETE DENTURE SERVICE

Ruth Moulton, M.D., New York, N. Y.*

Psychologic attitudes are important even in a seemingly mechanical problem like that associated with denture wearing. This is quite logical in view of our growing recognition of the importance of emotions. Not only may disease be caused partly by psychologic conditions, but even when a disease is predominately physical, the body cannot be handled as a separate entity because we have too much emotion invested in it. The mechanical approach has been increasingly

*Research assistant in psychiatry, Columbia Presbyterian Medical Center.

discredited, not only by the medical and dental professions, but by all who work with people, from businessmen, who find that the happy employee works better, to the Army, which finds that good morale improves fighting. The way in which a patient handles himself and his problem depends not just on his body and the way it is treated, but also on his attitude toward his body, toward himself as a person and toward his doctor.

The importance of emotions is being increasingly recognized even in surgery. Plastic surgeons have begun to include psychiatrists on their teams. Many general surgeons recognize that emotional security decreases postoperative complications, facilitates healing and thus greatly influences the success of therapy. Dentistry is like surgery in that its practice involves a tangible, visible maneuver, so that one's fingers can actually be placed on the source of trouble. Since the problem is more obvious, it lends itself more readily to a strictly mechanical approach, wherein the person is apt to be forgotten. The doctor then becomes concerned with an organ, a wound or a denture, and not with the total individual involved. In the case of dentures, it is not merely a matter of how they fit, how they look, how they work, but also how the patient uses them, how he puts up with the discomforts involved in getting adjusted to them and how he cooperates in the necessary procedures. The whole denture plan may be wrecked by his fears, his complaints, his unexplained discomfort or his reaction to his dentist. The purpose of this paper is to try to give some understanding of what goes on in the patient, on the assumption that this would be of the greatest help in handling denture problems.

Denture wearing is an elective procedure, not wholly comfortable to any one, and always something to become adjusted to. This adjustment can be made readily by the secure person, who experiences situations as they appear to most of us; that is, having a tooth out means nothing more than just that—"having a tooth out." However, some people's experiences change their perceptions so that things that happen to them mean something different to them from what one would expect.

For instance, loss of any part of the body, be it tooth or toe, may take on added meaning, as though the person were being deprived of an accessory necessary to life—just as a person's response to the loss of a $5 bill depends not only on how much he needs the money, but also on his emotional attitude toward it. A wealthy miser may be more upset than a poor person. If a person is insecure for any reason, he can stand less injury. However, a tooth is more important than a toe, as people are more concerned about their heads, as being more vital. Openings of the body are especially important emotionally, and people resist their being invaded—they are more intimate, more private and closer to a person.

Other special fears may be present; for example, needles may be particularly threatening images to some people, not just because of pain, but because something sharp is being forcibly jammed into the body. The insertion of the needle may be a symbol of being overpowered, especially in women who may be sensitive to being overpowered by a man, sexually or in any other way. Anesthesia is a special threat to many people because it causes a loss of control or a feeling of lessened awareness. This is most notably true of general anesthesia, wherein one does not even know what happens during unconsciousness. If he is conscious, he may feel powerless to do anything because of muscle paralysis. Just the temporary loss of feeling in the mouth or loss of control over some of the jaw muscles may frighten persons, who may fear extension of the sensation

to the point that they cannot swallow, breathe or eat. Appearance may be irrationally important to some people. They may fear any change in it. Jokes or comments about "false teeth" may really upset a sensitive, self-conscious person. This is especially true because the menopausal period, when many dentures are fitted, is a distressing period to most women anyway owing to the feeling of growing old, losing beauty and sexual ability, and the conviction that now it is too late to make of their lives what they wished. In general, it could be said that, in any person in conflict, the dentures may be seized upon as a tangible object on which fury and fear may be vented.

We have thus listed special "fears" that a patient may have concerning dentures. The word "fear" may be misleading, because the thing feared is an idea that the person has, not a real object in and of itself. This kind of irrational fear, called "neurotic anxiety," is not primarily related to the real situation, but is due to the twisted significance which the situation has to the patient. For instance, a needle evokes a response of fear as though it were a club that the patient is to be beaten with or a long pointed instrument to be jammed into the patient against his will. The patient might very well admit, after he discovered that part of him felt this way, that the feeling was unreasonable, but he would be unable to control the fear owing to its deep-seated origin. In other cases, just the discovery that he was prey to such an illogical idea might help him considerably to control it. The important thing is that a really "neurotic" fear is not amenable to the exercise of ordinary common sense. One can't "kid" a patient out of it. In handling such a fear, one has to have a respect for its depth. Anxiety may be expressed physically through diarrhea, nausea, trembling, weakness, insomnia, headaches—just to mention a few of the common ways. It may also be shown through frightening dreams or nightmares about bodily injury, bleeding, death, etc.

Another source of distorted reaction lies in the response of the doctor and patient to each other as two people. Many doctors fear their patients' feelings and so try to deny their presence. But the treatment of patients is a very personal thing, and a cloak of impersonality will not avoid this relation. A brusque, hurried, dogmatic approach frightens the patient more and shuts him up so that one doesn't know what trouble there is underneath and thus is not ready to handle it. The fearful patient becomes antagonistic and uncooperative, not through malice, but through fear, and a resulting attempt to protect himself. Some reassurance and explanation may allay his anxiety and promote cooperation, as well as warn the doctor not to make tactless, frightening remarks.

As to the patient's attitude toward the doctor: It may be said that the patient usually approaches the doctor with a set attitude, expecting little or much trouble, and it is certainly worth knowing what he anticipates. For instance, he may be so sure of experiencing pain and abuse that he is defensive and uncooperative, and the doctor is so annoyed that he feels like abusing him. The patient may transfer to the doctor some special conflict of his or her own. A woman may fear being touched by a man owing to unpleasant experiences with a father, brother, lover, etc.; or a man may be very critical and competitive with other men owing to an authoritative father who lorded it over him. Recognition that such attitudes are illogical, that they are a reflection on the patient and not on the doctor, helps one to be objective and not be drawn into the patient's neurosis; i.e., be defensive and less sympathetic than one would be with a comfortable patient. This frightens the patient more and he acts worse—thus there is a vicious circle.

Of course, one should not always assume that the patient is wrong about the doctor, as he is apt to be especially sensitive to the doctor's faults. In fact, it is wise for the doctor to give the patient the benefit of the doubt by determining whether he himself is at fault before saying that the patient's reaction is illogical or "neurotic." Experience in consultations in medical wards shows that most doctors have a habit of labeling the patient who is hard to get along with as "neurotic," overlooking equally important psychologic factors in the patient who behaves overtly and causes no trouble. It would be just as neurotic for a patient to suffer from a doctor's mistakes or lack of consideration in silence. I have no examples to give of various submissive patients, probably because they are not a problem to the dentist. I also have no example of unkindness, sharpness or an authoritarian approach frightening a patient into extreme behavior as, here again, none such were referred to me.

To return to the problem of what goes on in the patient: It is well to remember that pain means different things to different people. It may be a real threat to a fearful person. One never knows what previous miserable experience a person has had which gives him a "right," so to speak, to be more upset than average with a given amount of pain. A person under tension also can "take" much less. This may be true in two ways: The slight pain is "the last straw," or the person really experiences more pain with a given stimulus. Modern neurophysiology shows us possible ways in which this may be literally true. The state of the nervous system before stimulation determines what route the stimulus takes and determines how much more stimulation is needed before the total is painful. "Pain" is not a qualitatively different stimulus from touch, and the same stimulus may cause very different conditions in different people. Thus, the "hysterical" person is not "imagining" pain, but really feeling more of it owing to the state of his nervous system, although this may be due to an emotional state primarily and not initially a physical one. Thus, we have no right to treat him as a "spoiled baby" or malingerer, but as a person with a problem which we handle as practically as possible rather than berating him regarding it. The latter attitude makes him feel that he is falsely accused, as the pain is real to him.

One patient under tension felt that her dentures were "the last straw" and they gave her something tangible to complain about. They "jumped" and "scratched the gums" so that she had to go without the lower one several days three and four times a month. A few minutes conversation with her revealed that she was on the verge of tears about her arthritis, the death of her husband two years ago and the disappearance of most of her family in southern Russia when it was overrun by the Germans. She had lived through three revolutions and now found herself at the age of 53 living in a place that she hated and without friends. She was "very nervous," had anxiety attacks and had stomach and gallbladder trouble, probably with a large functional element. Just admitting that her life was tough and letting her weep a minute without ridiculing her or belittling her troubles made her feel better. Suggesting that the dentures were "the last straw" and that one could see why she would want them perfect, since the other sources of her troubles were not amenable to change, seemed to make her feel they were not so bad and not the real source of her misery.

Most doctors have learned to handle simple problems. The real problem lies in detecting more severe personality disorders in which the patient's responses are so pathologic that they cannot be

understood readily and do not respond, as anticipated, to reason. An attempt is made here to classify "neurotic" reactions in a way that agrees to some extent with psychiatric terminology, so that it has a more scientific basis than some of the classifications previously used. Since all "neurotic" reactions are based on fear of some kind, from this point of view one should never censure the patient for his peculiarity, even though it makes him difficult. Punitive attitudes are inappropriate and make the patient worse. In some patients, the fear may be much greater or nearer the surface. Some have a malicious or even vicious way of covering up and using their fear so as to gain social advantages over others. These are just as "sick," but their behavior makes it necessary to treat them more firmly. One might divide patients roughly into those who are just "plain scared" or obviously insecure, and those who are frightened underneath in some sense, but rather than showing it or wanting to change it, try to make themselves more comfortable at the expense of others by being overcritical, uncooperative, begging for sympathy, etc. It is useful to determine which of these ways of reacting is predominate.

One might broadly classify types of patients according to neurotic reactions as follows:

1. The first is the apprehensive patient who is anxious in a more simple, direct way, with less distortion of his fear, although it may show itself through bodily symptoms. It is wise to find out whether it is pain or bleeding or needles that he fears. Is it a possible change of appearance which upsets the self-conscious person? What are his expectations about this? If it is cancer that he fears, one may tell him that friction is not a factor. It is amazing how many older people fear cancer. Reassurance and explanation are most apt to have good results with this group. They are more flexible as they are more aware of their own trouble and able to admit it.

2. The chronic complainer expresses some fear, but it is more hidden from himself than from others. He is more apt to "torture" the doctor because of his problem; he becomes preoccupied with this battle and is less aware of the real cause of his discomfort. He may think that he is quite comfortable and be unaware that something in him compels him to be difficult. One thing he may do is to blame the doctor constantly. One may know that he has a tendency to do this by taking his history, in which he blames a succession of other doctors for "mistreating" him. If he blames the doctor's secretary irrationally, he may be blaming the doctor next. If the doctor suspects this reaction, he may warn the patient beforehand of the problem, so that he is prepared and has to share the responsibility for going on with the work. Thus, he has less overt reason to criticize the doctor later when he is dissatisfied. Another common pattern shown by this kind of person is the result of a drive to get attention and sympathy. When one thing is corrected, he needs to find another to complain about to keep the doctor interested. It is important to give the patient the benefit of the doubt and to correct anything that might be the real source of trouble, but it is equally important to be firm and not give in to unreasonable demands. It won't satisfy or help the patient in the long run. He loses respect for the doctor if he feels that he can "push him around," and he becomes confirmed in his neurosis, feeling that if the doctor alters the treatment, he, the patient, must have been right in the first place.

Two examples may be useful here, as they show a real difference, although neither is an example of simple apprehension.

The first is that of a woman aged 55

whose menopause occurred three years ago. Old dentures, made ten years earlier, had given her no trouble. She complained constantly about her new dentures as being too large, as slipping and as being uncomfortable. The dentures were considered perfect, although she made their fitting difficult. Talking with her revealed that she was married to a very cold, aloof Englishman who had never given her the warmth of affection that she needed. She had gained 70 pounds in the three years since the menopause, having completely lost interest in her appearance, much to his disgust. She was a rather childish person and was thirteen years younger than he. He thought that the teeth were beautiful, and her need to annoy him made them seem impossible to her, and they became a bone of contention. The dentures were the only thing that she was not indifferent about. She was rather simple and childish and wanted to be babied and taken care of, but she was rather easily pacified and made more comfortable by explanation that it was bound to take several weeks for her mouth to readjust itself to the new dentures, and that they were not larger but looked that way owing to their different construction. A cool attitude on the doctor's part made her badger him as she did her husband. With a little warmth, she melted and was quite flexible.

This case may be contrasted with the following case which was much harder to handle.

A woman aged 44, who tried to look 20 and who was married to a man six years her junior, drowned the listener with a flood of complaints and did not want to listen to anything. She obviously enjoyed talking about how miserable she was. Her husband had recently been reported missing in action, but she was so self-centered that she was less concerned about his death than about getting a job so she would not have to move in with her sister.

Her past history was documentary evidence as to why she was driven to seek medical attention continually. She had had an operation twenty years before for "ptosis" of the viscera and had been suffering from "attacks of adhesions" ever since. This certainly was a functional problem originally, much exaggerated by surgical intervention, which was unwise, but was consented to in order to please the patient. This is a good example of a doctor's giving in to satisfy the patient and making the patient worse.

The patient had come into the emergency room seven times in two years for the most minor complaints, such as a small piece of glass in her finger, acute pharyngitis, hoarseness and trouble in swallowing, which were obviously the result of anxiety, and vomiting, which came on when her husband was drafted. Anyone who knew the history would be very careful not to do a single thing that was unnecessary as it would only give the patient something else to focus her symptoms on. In this case, there had been a choice between getting along with her own teeth and having a denture made. One would certainly recommend that this kind of person be adequately warned that a denture merely meant a new set of problems, or be told that it would be better for her to keep her own teeth if she could afford to care for them. This woman was totally lacking in insight, and would misuse any explanation made to her, so that all one could hope to do was to bear with her with great firmness, although without harshness.

This kind of person probably never would be satisfied, and one would have to say finally when the time came that the dentures were as good as could be, and nothing more could be done, and stick to this decision without worrying about her dissatisfaction.

3. A third group includes the hysteriac with conversion symptoms and the hypochondriac, who may be considered together for our purposes, as in both cases there is a bizarre or utterly unreal complaint so out of proportion or so nonunderstandable to the ordinary person that the patient seems almost deluded on this point. The false ideas here are apt to be so fixed that they cannot be moved without extensive psychiatric therapy, and some are so rigid as to be incurable. The delusion may border on a psychosis in some. One may detect this more severe reaction by the unusual description of the patient, who may say that the pain in the socket where her tooth was

removed is "like a rusty nail twisting, scraping, gnawing." Another clue is the exaggerated insistence of the patient and his inability to see its irrationality.

An example was a patient with glossodynia who blamed the burning of her mouth, the pains in her jaws and her heart attacks on her dentures. She had "heart attacks" when she ate or when she put her teeth in. She got a compressed feeling in her throat, which is a typical hysterical symptom. As her heart trouble was very slight, the attacks were more the result of anxiety than anything else. She felt that wearing the denture "unnerved" her, gave her pains in her heart and head which went to her brain and made her bite her lips so that she would get cancer. She was completely inaccessible to reason and without insight, so that it was futile to try to change her. One could merely say that such things were impossible and handle her as considerately as one was able.

4. The obsessive or exacting patient is one who is preoccupied in a repetitive fashion with detail and insists that things be just so. He is apt to put pressure on the doctor to do things a certain way and to make results perfect. He cannot stand to have things imperfect or wrong, and thus is always dissatisfied and needs to "push" other people "around" to make it right. The trouble here is not related to the dentures as such, as they are just used as a focus for the symptoms which the patient undoubtedly has elsewhere. This reaction is often based on a fear of being dominated, due to great insecurity in childhood, but the patient has such need to get control over the doctor that the latter must realize the situation in order to protect himself from such an experience as the following.

This case presents an amazing situation in which a dentist was so taken in by a patient's neurosis or else so afraid of her that he treated her free for two and one-half years in an attempt to satisfy her about her dentures. If he had known a little of her past history, which included a great many types of psychiatric care with no success, he would have spared himself untold trouble.

All of her life, the patient had been prey to neurotic fears of sin and guilt. She was so filled with doubts about what she should do that she was practically unable to cross a street alone for fear that it would be the wrong thing to do. She was so indecisive that she couldn't decide whether to start preparing a meal and thus didn't cook. Her husband, who was her slave, went everywhere with her. He gave up a job and lived on a veteran's pension to wait on her.

All of her life, she focused her problems on something at hand: religion, her husband, her stomach or, for the last four years, her teeth. When she concentrated on her teeth, her other symptoms were less upsetting. She literally spent months trying to decide which dentist to go to. Her complaints began as soon as the dentures were made, and to date have never ceased. In one year, she went to the dentist thirty-seven times to have the plates ground down or built up because they did not feel comfortable. Nothing he did was right. If he didn't give in and correct a defect he couldn't see, she accused him of disinterest. If he made a change, she doubted his wisdom, fearing that she had put too much pressure on him. She phoned him almost daily at times, and expected and received free office advice or treatment whenever she felt the need, for the two and one-half years, feeling that this service should be included in the original price of the dentures. The dentist's inability to be firm and consistent with her led her to battle with him more and more and "push him around" as she had her husband.

Had he realized that she was exploiting him, he could have discontinued treatment and saved them both much needless difficulty. Any member of her family could have told him what a problem she was, what a long history of unsuccessful psychotherapy she had, and he could then have prevented the situation in which he found himself by being firm and consistent in his approach, realizing that satisfying her was impossible. He then would have been able to decide, without her interference, as to what was reasonable. Here, the doctor was naive

and the patient unkind, but it might have been the reverse.

5. Paranoics are those who always feel that they are being persecuted. They imagine that people are against them and they are apt to look for evidence to use against the doctor. Sometimes, they are members of a minority group who feel that the world is against them. Less frequently, they are shrewd, calculating, intelligent people who seek occasion for lawsuits and cause endless trouble. They can be very difficult to handle. One can merely explain the situation, but put no pressure on them, guarantee no perfect results and let the patient take it or leave it. If they decide against following his advice, the doctor is probably well rid of a difficult problem.

6. Negativistic people are those who actively fight against the denture procedure at every step by taking an opposite stand. If one asks if something is too big, they find it too small, or vice versa. This reaction is most apt to be found among those who originally did not want dentures, such as the old man whose family insists. He may agree to please them, and go along with the procedure passively. In this case, he may not be hard to handle unless some active cooperation is required of him; or he may agree to go through with it to please his family and try to sabotage the plan at each turn in a negativistic fashion. If one senses this, and cannot break it down by some friendly appeal to the person himself, it might be best not to treat him, for, in the long run, when cooperation is needed, it is impossible to force an elective procedure on an unwilling person, even though it pleases his relatives. One can often elicit the cooperation of relatives in bringing the patient around, or one can try to stop their interference.

7. Depressed patients may not be hard to work with if their depression manifests itself mainly as indifference; but if they feel that treatment is not worth while, that their life is ruined anyway, that nothing matters because they are getting middle-aged and that their appearance is hopeless, it may do a great deal of good to encourage them actively. They may respond amazingly when they realize that there is a chance for improvement in appearance, and that their condition is not hopeless. An example was the case of a person with syphilitic stigmata of the face and jaw in which surgery plus dental repair gave a woman considering suicide a new lease on life, although much encouragement was necessary to lead her to cooperate.

8. Psychotic reactions will not be considered here, as any severe case is not likely to come to the dentist. The milder ones usually do not offer any special problems. One dentist, who was consulted in preparing this paper and who had worked for years on patients in a psychiatric hospital, as well as in private practice, said that he did not find one group of patients any harder to deal with essentially than another. He said that he did not encounter any special problems in mental patients, and that he had almost never had a patient who needed dentures who did not want them enough to be worked with. The milder psychotic reactions are seen in the mild manic-depressive, who talks too much, too fast and in a not quite relevant normal fashion. He is likely to be emotionally labile; he laughs and cries easily or is rather irritable and irascible. The depressed phase of this illness is no different from the neurotic condition with depression except that, in more severe cases, the person may completely neglect his appearance and not talk at all, be indifferent to the outside world or be chronically tearful. The schizoid person is either distant and withdrawn and so preoccupied with his own problems that it is hard for contact to be made with him, or he may have delusions about his body, such as that he has a fulminating cancer

in his mouth; or he may be very distractible and panicky. If one suspects any of these more severe reactions, when one senses that something deeply abnormal and inaccessible to the outside world is present, it is best to send the person to a psychiatrist for diagnosis, or to get a history from the relatives as to the patient's reliability, the extent of his illness, his ability to carry through a process, his general outside behavior, etc., in order to determine whether it is practical to try to work with him. It is certainly wise to share the responsibility here with a psychiatrist, and to seek suggestions from the latter if the patient is already working with a psychiatrist. One may also refer the patient for some psychiatric help. The trouble about this is that only rarely is a psychiatrist willing or able to treat one symptom, such as helping a person handle his fear of injections, for example, without treating the person for a whole personality problem. This means that, to get much relief from his trouble, the patient must wish to change himself and be willing to disclose his most intimate problems.

Practical suggestions based on these concepts are hard to formulate for one who is not practicing dentistry. When one makes them general, they are apt to sound too simple, and are what any tactful doctor would find unnecessary. I consulted two successful, competent dentists about this problem and they both felt that the essence of it was to realize that the patient's feelings are important and not extraneous, and then treat each person as an individual, rather than to get into the habit of using a stereotyped, mechanical approach for every one. Attempts have been made to find a questionnaire which could be used to classify; i.e., to discover whether the patient has any irrational reactions of such depth that they will not respond to ordinary reassurance and reasonable explanation. One such attempt was made by two dental students at Columbia, who had the help of psychologists and other people trained in the use of "objective" technics. They made up a questionnaire to be answered by "yes" and "no" which was given to the patient informally while he was sitting in the dental chair and in such a way that he was unaware of being questioned. However, they were unable to correlate statistically the answers and the fact that the patient was a "good" one or a "bad" one. This is what many psychiatrists would have expected, as the use of any kind of questionnaire to find out facts about people has been disappointing as compared with a more flexible type of observation. As far as I know, the Army has largely given up objective methods of eliminating unsuitable inductees on psychiatric grounds, as it was found that a psychiatrist could learn more by talking to a man for three minutes. Even an untrained person can learn more by listening to a person with active interest, if he has some idea of what he is looking for.

There are specific reasons why a questionnaire is bad. People are suspicious regarding questioning. It makes them alert not to give themselves away and puts them on the defensive, whereas if they are unaware that you are trying to learn something about them, they will often spontaneously give themselves away. There are too many possible things to look for. A person, if he wants help, is likely unconsciously to talk about the most important thing, even though he may not know it. If too large a part of him is resistant, he won't be accessible with or without a questionnaire. He might give the right answers to cover up feelings which can more easily be detected by watching him. The patient often would not know the answer to a direct question, such as "Are you unduly afraid?" or "Do you have need to complain about your dentures to get attention?" But he might give the information by reporting a dream which scared him or by telling how nauseated he had

been the last few days. Finally, one may say that mechanical aids dull perception.

I feel that a more flexible and informal type of exploration is better—a conversation directed toward certain goals to determine what the patient feels, fears and expects. The following practical points might be useful:

1. The initial contact is very important. The first impression on the patient is indelible and one's attitude may determine his whole approach to the problem. The problem should be thoughtfully presented—why he needs dentures, what he may expect, etc.

2. One should listen to the patient's story. He will feel much better and the dentist will know more about him and what he himself has to deal with. Also the patient should be observed as his actions may be more revealing than his words. There is no secret as to what people are like. It is largely a matter of taking the trouble to be interested and to observe. We all have first-hand experience as to how people "work" by living with ourselves, and people differ mainly in degree, not in kind. Observation is not a matter of more time, necessarily, but of alertness and shrewdness. Instead of taking his mind off himself immediately by talking about the weather, the patient should be given a chance to tell the dentist what is on his mind. This does not mean encouraging complaints, but finding out what he has in mind before silencing him. As has often been said, "From those who have eyes to see and ears to hear, no man can hide his secret."

3. A competent, sensitive secretary may gather evidence that the patient is apprehensive, dissatisfied, being undermined by difficult relatives or in need of explanations. Clinics often use a social worker very successfully for this purpose, allowing the patient to talk a few minutes each time.

4. It is wise to get somewhat acquainted with the patient before making comments as to the length of treatment, total price, reasonable expectations, etc. He should be allowed to talk before he is told too much. Thus the dentist will not find himself promising unlimited service to a patient who will take advantage of him. A medical and dental history should be taken, and an effort should be made to determine what role the patient's personality played in determining its course. Some dentists (here I am indebted to Dr. Sperber) make it a practice to find out who the previous dentist was and why the patient left him, and, if possible, to contact that dentist to obtain information about the patient.

5. It rarely pays to try to force or unduly persuade a patient to do anything, such as having dentures made. If one gives advice, with some explanations, and leaves it to him to decide, the patient will usually return to the dentist, and if he does not, a difficult situation may have been avoided.

6. The dentist should not let a patient force him into doing anything that he thinks unwise or unnecessary, lest he lose his own integrity and the patient think less of him and, in the long run, fail to be helped.

7. Eliciting the cooperation of relatives is very useful, as their help may be essential and their influence over the patient in the wrong direction may be very detrimental.

8. Rigid ideas about the extent and tempo of therapy cause trouble. One needs to go slower and do less at a time with certain people, or to choose a simpler procedure even though it may not be scientifically the best. A perfect denture that will last fifteen years is useless to a person who won't wear it or who suffers unduly mentally to do so. One may let the patient or responsible relative help in making such a compromise. Removing all teeth at one time may be an unnecessary shock and slower stages may cost more, but be worth while in terms of satisfaction.

CONSTRUCTION OF IMMEDIATE TEMPORARY BRIDGE

W. E. Ludwick, D.D.S., A.B., B.Sc., Cape May, N. J.*

Immediate temporary bridges have long been advocated, particularly in the incisor region, because the patient is vitally concerned with the appearance of this area. With this in mind, a simplified and inexpensive method of constructing a bridge is presented. The bridge serves as a space maintainer, keeping the adjacent teeth from drifting into new positions, while not interfering with the normal healing of the gingival tissue.

In the two years that this bridge has been used, no condition has developed in which its use was contraindicated. In some mouths, the bridge remained in position as long as six months before a more permanent bridge or denture could be constructed. During the period that the immediate temporary bridges have been in place, all the patients have been well satisfied. The appearance and enunciation were not altered and none complained of discomfort.

The bridge can be removed and replaced quickly so that at no time does the patient have to be edentulous. For these reasons, the bridge is preferable to an immediate denture in the majority of cases.

This technic is simple, rapid and easy, because it utilizes the crowns of the extracted teeth, which become the pontics for the immediate temporary bridge. Thus, the selection and fitting of porcelain pontics and the construction of bands and overlays for temporary abutment pieces are eliminated. This technic can be used only in the replacement of one or two teeth in the upper anterior area. The replacement of more than two teeth has not proved successful at this time, nor has the replacement of lower incisors been so satisfactory.

The outline presented below depicts the necessary steps for desired results in the replacement of a single tooth. The same steps are required for the replacement of two teeth and, when modifications arise, they will be dealt with in the outline.

1. The anesthesia of choice is infiltration, with an anesthetic meeting standards established by the American Dental Association. This is injected into the subcutaneous tissue to reach the nerve terminals and blood vessels supplying the area. General anesthesia could be used, but the postoperative hemorrhage that usually follows extraction hinders the construction of the temporary bridge.

2. The tooth is extracted in the routine method.

3. The extracted tooth is cut at the gingival line with a carborundum disk. The root is removed and discarded. (Fig. 1*a*.) The crown of the tooth now becomes the pontic of the temporary bridge.

4. The pontic (Fig. 1*b*) should be contoured by a carborundum stone to fit the gingival tissue. The pontic should not be permitted to extend below the free margin of the gingival tissue when the incisal edge is in correct relation to the abutment teeth. If the operator should desire the pontic of the permanent bridge to extend below the free margin of the gingival tissue, the tem-

*Lieutenant Commander (DC) USN.

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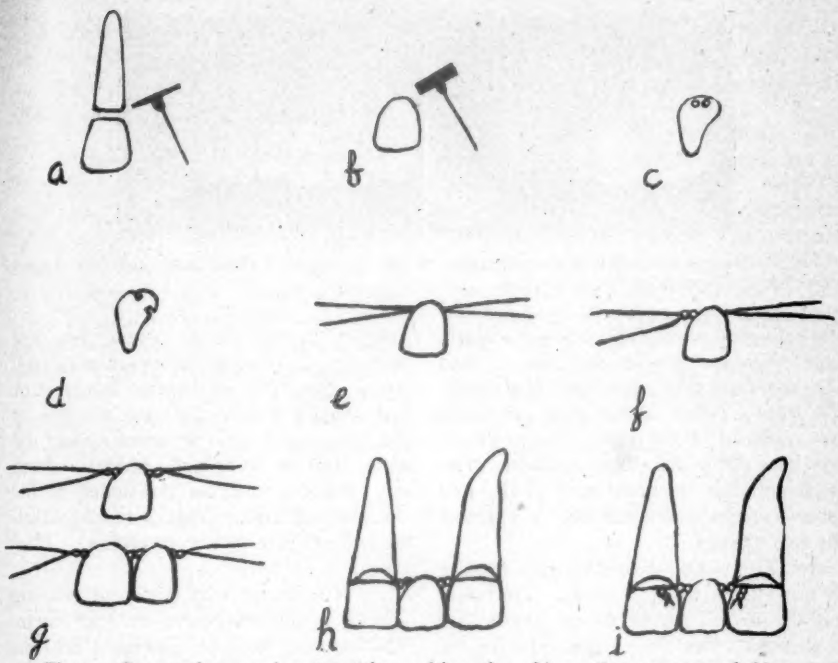

Fig. 1.—Consecutive steps in preparation and insertion of immediate temporary bridge.

porary pontic should be contoured to the desired relation at this time. The pontic should be repaired or rebuilt if part of it has been destroyed by caries or fractured. Zinc phosphate or silicate cement can be used for this reconstruction.

5. The pulp chamber should be thoroughly cleaned and sterilized with a powerful germicide before filling with gutta-percha or temporary stopping. The gingival end of the pontic is now polished to insure a nonirritating surface.

6. Two holes from the mesial to the distal aspect should be drilled in the pontic with a No. 34 inverted cone bur placed well toward its gingival end. (Fig. 1*c*.)

(It should be mentioned here that this technic can also be used when the extraction involves removal of a root that has a porcelain tube tooth attached to it by means of a dowel or pin. The preceding steps are the same except that two grooves replace the holes in the porcelain pontic. One groove is cut mesiodistally with a carborundum disk on the root end of the pontic. The other groove is cut on the cingulum of the pontic. [Fig. 1*d*.])

7. One piece of stainless steel wire (diameter 0.010) 2 inches long is placed through each of the two holes in the gingival end of the pontic, which is positioned equidistant from the ends of the wires. (Fig. 1*e*.) When the porcelain tube tooth is used, the wires are placed in the grooves.

8. The two wires on the mesial are twisted together with two turns by a pair of flat nosed pliers. (Fig. 1*f*.)

9. The two wires on the distal aspect should be taut before using the pliers to twist them together two turns. (Fig. 1*g*, above.) Every effort should be made to have the pontic very secure between

Fig. 2.—Temporary bridge replacing upper left lateral incisor. Left: Condition before extraction. Right: Temporary bridge in place.

these twisted wires. This is particularly true when the grooves are used to hold the wires in the porcelain tube tooth. Figure 1*g*, below, shows how two teeth are replaced. Both pontics are prepared in the above-described method. The second pontic is placed next to the first pontic on the wires and held in position by two twists.

10. The pontic with the wires in place is now taken to the mouth. The wires on the mesial aspect of the pontic are separated. One wire is placed over the labial surface of the abutment tooth and through to the lingual just below the contact point. The other wire of the same pair is placed through to the lingual aspect of the abutment tooth. The other wires on the distal aspect of the pontic are similarly positioned on the opposite abutment tooth. Now both pairs of wires are in such a position that they can be drawn up and twisted tight on the lingual side of the abutment tooth. Care should be taken that the wires are kept well toward the proximal surfaces of the pontic when they are twisted. If possible, in positioning the pontic, the wires are kept at the crest or just slightly below the free margin of the gingival tissue. In some cases, the wires may be completely hidden. Both sets of wires must be positioned below the greatest circumference of the abutment teeth for better retention. (Fig. 1*h*.)

11. The excess wire is cut off, leaving a stub which has three or four turns. The stub can then be burnished into the interproximal spaces on either side of the pontic. When in this position, the ends have less tendency to unravel and cause less irritation to the gingival tissue and the tongue. (Fig. 1*i*.) If the pontic does not appear to be in correct position in relation to the other teeth, it can be changed readily. The pontic is grasped by placing the thumb on its labial surface, and the index finger on its lingual surface, and, with application of sufficient pressure, the pontic is moved into correct position.

Fig. 3.—Temporary bridge replacing two teeth. Left: Condition before extraction. Center: Edentulous area. Right: Temporary bridge in place.

A one-tooth immediate temporary bridge is illustrated in Figure 2. Figure 3 shows the replacement of two teeth by this method.

Summary and Conclusions

When an anterior upper tooth has been extracted, the crown is cut off and used for the pontic of an immediate temporary bridge. Next, two holes are drilled in the gingival end of the pontic from mesial to distal aspect with a No. 34 inverted cone bur. Two wires 2 inches long (diameter 0.010) are placed in these holes. The pontic is spaced equidistantly on the wires and twisted tight at each end. It is then inserted in the space and the wires are secured on each adjacent abutment tooth, so that support is given to the immediate temporary bridge.

These simple steps afford the dentist a quick, efficient method of making an immediate temporary bridge with a minimum of expense. The extraction and the construction of the bridge should consume about twenty minutes if the removal of the tooth is routine. When two upper incisors are replaced, the time is only slightly longer. The finished immediate temporary bridge gives the patient an excellent restoration esthetically and phonetically.

U. S. Naval Air Station.

FLUORINE AND DENTAL CARIES*

Philip Jay,† D.D.S., Ann Arbor, Mich.

The inverse relation between fluoride-bearing domestic water and the prevalence of dental caries in children has been definitely established. The intensity of dental caries attack as measured by the extent of caries experience in the permanent teeth of children 12 to 14 years old who are continuously exposed to fluoride water is strikingly lower than that in children who live in neighboring communities supplied by fluoride-free waters. Observations to this effect have been made by Dean[1] and his associates in the United States, by Ockerse[2] in South Africa, by Ainsworth and Weaver[3] in England and by others in different parts of the world. This is one of the few findings in dental caries research that have not become the subject of controversy.

Because of the toxic nature of fluorine, the possible application of this development in caries research has been approached cautiously by most investigators in this field. Others have been less conservative so that the prospect of the fantastic exploitation of fluorine in dental caries control is a menacing possibility. It is for this reason that an attempt will be made to bring this rapidly expanding subject up to date, although adequate reviews have been published from time to time in the past.[4, 5]

*The Council on Dental Therapeutics has authorized publication of this report as one of the series on pharmacology and therapeutics. The opinions expressed are those of the author and do not necessarily reflect the opinion of the Council.

†School of Dentistry, University of Michigan.

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3. Weaver, Robert: Fluorosis and Dental Caries on Tyneside. Brit. D. J. 76:29, January 21, 1944.

4. Hodge, H. C.: Is Fluorine a Therapeutic Agent for Dental Caries? J.A.D.A. 29: 2063, November 1, 1942.

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The preponderance of evidence indicates that fluorine is the active caries-inhibitory factor in the water supplies. All of the communities studied which were supplied by water containing more than 0.5 p.p.m. (parts per million) of fluorine had low dental caries rates. No correlation was observed between the prevalence of dental caries and the mineral content of the water as indicated by the total hardness. As an illustration, Colorado Springs was found to have a caries rate of 246 (the number of permanent teeth with caries experience per hundred children 12 to 14 years old). The fluorine content of the water was 2.6 p.p.m. The caries rate of Elmhurst, Ill., with a water supply containing 1.8 p.p.m. of fluorine was 252. The caries rates in both of these fluoride areas were low; yet the total hardness of the Colorado Springs water was 27 p.p.m., as compared with 323 p.p.m. of the Elmhurst water. To illustrate this point further, the high caries rate of Middletown, Ohio (703), was associated with water which was practically fluorine free (0.2 p.p.m.), but which had a total hardness of 329, as compared with 27 p.p.m. for Colorado Springs.[6] The low caries rate in Deaf Smith County, Texas, has been attributed, in part, to the high phosphorus content of the locally-grown produce. In reality, the Texas foods are not remarkably different in phosphorus content from foods produced in most regions of the United States, regardless of the incidence of dental caries.[7] Solar radiation, which has also been suggested as a complicating factor, may be eliminated from consideration. The neighboring cities of Oak Park and Maywood, Ill., are exposed to the same amount of sunlight, but the caries rates differ greatly. Maywood, with a water supply containing 1.2 p.p.m. of fluorine, has a caries rate of 258, as compared with the high caries rate of 722 in Oak Park, which is supplied with fluorine-free Lake Michigan water. The domestic water supplies of the low-caries communities vary in other respects, but they all contain fluorine, so that fluorine seems to be the active principle involved.

Experiments in Animals

Dental caries can be produced experimentally in susceptible rats by the inclusion of coarsely-ground corn or rice in the ration.[8] The caries-producing potency of this diet is greatly diminished by the inclusion of fluorine, either directly in the ration or in the drinking water used by the experimental animals.[9] This finding is a further indication that fluorine is responsible for the caries-inhibiting property of certain domestic waters. The idea loses specificity somewhat by the fact that iodo-acetic acid, another enzyme inhibitor, is also effective in reducing the severity of rat caries.[9] Inasmuch as experimental rat caries is so dependent upon the physical quality of the diet, its similarity to caries in human beings is not complete. The inhibition of rat caries by fluorine is, therefore, not an absolute indication that fluorine would be equally effective in man.

On the other hand, hamster caries can be produced on either coarse or fine diets, thereby more closely resembling caries in man,[10] and caries in this animal is also inhibited by the inclusion of fluorine in

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10. Arnold, F. A., Jr.: Production of Carious Lesions in Molar Teeth of Hamsters (C. Auratus). Pub. Health Rep. 57:1599, October 23, 1942.

the experimental diet.[11] Unlike the rat, the hamster also develops smooth surface caries under experimental conditions. It would be interesting to know if fluorine inhibits this type of caries as well as the occlusal type, since the reduction of dental caries on the smooth surfaces of the teeth is most striking in persons residing in fluoride areas. From the available data on the hamster, this important distinction cannot be made.

Caries in animals has been inhibited repeatedly when the fluorine was introduced by mouth. The fact that fluorine introduced subcutaneously in comparable doses does not inhibit rat caries may be a clue to the nature of this phenomenon.[12] When Arnold and McClure injected amounts of fluorine comparable to 50 p.p.m. in drinking water for rats, they found that the fluorine content of molar enamel had increased but that caries was not inhibited. This finding might be interpreted to indicate that the fluorine was adsorbed by the dentinal aspect of the enamel and hence exerted no antienzymatic or antibacterial effect on the oral surface of the teeth. The increase in the fluorine content of rat molar enamel following the feeding of fluorine by mouth and the fact that this increase was accompanied by the reduction of caries activity suggests that enamel is capable of adsorbing this substance.[13, 14] Studies by Armstrong, which indicate that caries-free teeth contain more fluorine than carious teeth, lend still more credence to the probability that fluorine is responsible for the low prevalence of caries in communities supplied by fluoride-bearing waters.[15]

Studies on Addition of Fluorine to Drinking Water

The evidence is very impressive, but still largely presumptive. It remains to be seen whether the addition of fluorine to a fluorine-free water will be accompanied by a decline in the rate and intensity of caries attack in a population exposed to water so treated. Two such studies are now in progress. The water supply of Newburg, N. Y., is being treated with sodium fluoride under the supervision of the New York State Department of Health, and the water supplied to Grand Rapids, Mich., is being similarly treated by the Michigan Department of Health in collaboration with the U. S. Public Health Service, and the University of Michigan. In each case, the water, as it is distributed, contains approximately 1 p.p.m. of fluorine, and the projects are being conducted under experimental conditions with suitable checks and controls. The trends will very likely not be discernible before 1950 and possibly later. Until such time as the progress of these studies can be evaluated, the universal treatment of water with fluoride, except under rigidly controlled experimental conditions, is not indicated.

One part per million of fluorine was chosen inasmuch as mottled enamel is of no clinical importance at that level. Although the caries rates are inversely proportional to the amount of fluorine in the water, the declining caries rates level off at from 1 to 1.5 p.p.m., so that the maximum inhibition of caries occurs at approximately 1 p.p.m.[8]

11. Keyes, P. H.; Dales, P. P., and Lazansky, J. P.: Production and Inhibition of Dental Caries in Syrian Hamsters. J. D. Res. 23:445, December 1944.

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14. Volker, J. F.: Effect of Fluorine on Solubility of Enamel and Dentin. Proc. Soc. Exper. Biol. and Med. 42:725, December 1939.

15. Armstrong, W. D.: Fluorine Content of Enamel and Dentin of Sound and Carious Teeth. J. Biol. Chem. 119, Scientific Proc., 31:v, April 1937.

There is no reason to believe that toxic effects will accrue from fluorine ingested at this level. McClure has calculated the fluorine intake for children exposed to drinking water containing 1 p.p.m. of fluoride to be from 1 to 1.5 mg. per day from food and water.[16] The fluorine content of foods is the same in all parts of the United States so that in the treatment of water supply the natural geographic distribution of fluoride need not be considered. The lethal dose of sodium fluoride is considered to be about 4 gm. A dose of 228 mg. has been known to produce toxic symptoms.[17] In view of the fact that 88 per cent of the fluorine ingested is excreted in the urine and 8 per cent in the feces, the ingestion of 1 or 2 mg. of fluoride daily does not constitute a hazard.[18, 19] The fluorine not excreted is stored in the skeletal system, but pathologic conditions have not been observed in thousands of persons in this country who have been exposed for many years to water containing 1 to 2 p.p.m. of fluoride.[20]

Other Methods of Fluorine Application

The epidemiologic studies do not indicate that the caries-inhibiting factor in domestic water will benefit persons who move into fluoride areas after the teeth are formed. There is some evidence that adult males who had spent the first eight years of life in fluoride areas before moving out had less caries than those spending all of their lives in fluoride-free areas, as revealed by the examination of selectees in induction centers in Illinois.[21] Other methods of fluorine application have been suggested for those who are not likely to benefit by the treatment of domestic water. They are chiefly the use of capsules containing bone meal, which is rich in fluoride, and the topical application of sodium fluoride in solution or paste form.

The evidence favoring the use of bone meal is, to date, not impressive. One study reports its successful use in nine adults.[22] This was a preliminary investigation which lacked controls, and extravagant claims were not made by the author. The fact that fluorine ingested in bone meal is largely excreted in the feces is an indication that it is not readily metabolized in this form.[23] The publication of this study, however, provided the stimulus for the sales promotion of bone meal products for caries control. There is no evidence that the ingestion of fluorine after tooth calcification will arrest caries activity in man. Favorable results have been reported when fluoride was applied topically to the teeth. The use of bone meal in capsule form precludes the possibility of contact with the teeth, so that it is not likely that this form of fluorine therapy would be at all effective. Neither does it seem likely that sodium fluoride, as used in a mouthwash, will

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21. Deatherage, C. F.: Mottled Enamel from the Standpoint of the Public Health Dentist (Including the Relation of Fluorine to Dental Caries in Illinois), pp. 81-101. In Moulton, F. R. (editor), Fluorine and Dental Health. Washington: American Association for the Advancement of Science, 1942.

22. Harootian, S. G.: Influence of Administration of Bone Flour on Dental Caries. J.A.D.A. 30:1396, September 1943.

23. McClure, F. J.; Mitchell, H. H.; Hamilton, T. S., and Kinser, C. A.: Balances of Fluorine Ingested from Various Sources in Food and Water by Five Young Men. Excretion of Fluorine Through the Skin. J. Indust. Hyg. & Toxicol. 27:159, June 1945.

reduce caries activity significantly. The one published report which suggests its use does not contain convincing evidence that 5 p.p.m. of sodium fluoride in a mouthwash is beneficial.[24] No data have been published on the effect of fluorine-containing dentifrices so that there is no indication for the use of fluorides in mouthwashes or dentifrices at this time.

The use of fluoride applied topically to the teeth has received considerable attention. Cheyne[25] treated twenty-seven children 4 to 6 years old with 0.05 per cent potassium fluoride in aqueous solution. The solution was applied to all of the teeth after a prophylaxis, and the treatment was repeated four times during the year of the study. A control group was given the prophylactic treatment without the fluoride solution. The treatment group averaged 3.09 new lesions as compared with 6.04 for the control group, a difference which amounted to a 50 per cent reduction associated with the fluoride treatment.

Bibby[26] treated one quadrant of the mouth of each of ninety children 10 to 13 years of age with a 0.1 per cent sodium fluoride solution for a period of one year. Eighty of these children received the treatments for two years. All averaged three treatments per year for the entire period. Bibby observed about a 40 per cent reduction in caries activity for the treated teeth. Somewhat less protection was noted for the second year than for the first.

Knutson and Armstrong[27] treated one-half of the mouths of 300 children 7 to 15 years of age with a 2 per cent sodium fluoride solution. The children received seven to fifteen treatments during the course of a year, with a 40 per cent reduction in new caries. Those who received fifteen treatments were afforded no greater protection than those who received seven treatments. These authors suggested that one treatment might be sufficient. On the other hand, Arnold, Dean and Singleton[28] found that one treatment with one-half per cent sodium fluoride solution provided no protection to ninety-four coast guard cadets, with an average age of 19.6 years. The solution used was weaker than that used by Knutson and Armstrong but stronger than the Bibby solution, and the subjects were of an older age group. It would seem, then, that multiple treatments of potassium or sodium fluoride solution of 0.05, 0.1 or 2.0 per cent strength inhibited dental caries in children 4 to 15 years of age, while a single treatment with 1.0 per cent solution did not prevent dental caries in 19-year-old men. It is perfectly obvious that this field requires further exploration, although there is an indication that more than one topical application of fluoride solution may afford some protection against caries for the teeth of young children. Largent and Moses[29] observed no increase in the fluoride content of the urine or feces of subjects whose teeth were treated topically, so it may be assumed that harmful systemic effects will not result from this type of treatment by, or under, the supervision of a dentist.

Action of Fluorine in Control of Caries

The nature of the caries-inhibiting

24. Atkins, A. P.: Practical Caries Control. J.A.D.A. 31:353, March 1944.

25. Cheyne, V. D.: Human Dental Caries and Topically Applied Fluorine: A Preliminary Report. J.A.D.A. 29:804. May 1942.

26. Bibby, B. G.: Use of Fluorine in the Prevention of Dental Caries. 1. Rationale of Approach. J.A.D.A. 31:228, February 1, 1944.

27. Knutson, J. W., and Armstrong, W. D.: Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. Pub. Health Rep. 58:1701, November 19, 1943.

28. Arnold, F. A.; Dean, H. T., and Singleton, D. E., Jr.: Effect of Caries Incidence of a Single Topical Application of a Fluoride Solution to the Teeth of Young Adult Males of a Military Population. J. D. Res. 23:155, June 1944.

29. Largent, E. J., and Moses, J. B.: Topical Application of Fluoride and Fluoride Absorption. J.A.D.A. 30:1246, August 1943.

properties of fluoride water is not understood. It is clear that continuous exposure to water containing as little as 0.5 p.p.m. of fluoride during the first eight years of life affords most persons a significant degree of protection against dental caries. Whether treatment of domestic water with fluoride will produce the same result will be determined by studies now in progress. In the meantime, it is interesting to speculate about this curious phenomenon. If fluorine is the specific caries-inhibiting factor present in the water, it must, apparently, be incorporated in the dental enamel to be effective, since it is necessary to ingest the fluorine during the period of tooth development or to have it applied to the surface of the tooth repeatedly in rather concentrated solutions, resulting in an adsorption of the fluoride by the enamel. The fluorine must function in one of two ways. It either modifies the tooth structure in a manner that confers upon it a degree of immunity to caries attack or else it serves to mitigate the potency of the attacking force itself. Since the presence of fluorine does render highly mineralized substances less soluble, it has been suggested that teeth rich in fluorine decay less readily than teeth deficient in fluorine because they are able to resist the acids which ordinarily produce tooth cavitation.[14, 30] On the other hand, we have convincing evidence that the acid-producing potential of the dental environment has been altered in fluoride water areas. It is not the purpose of this report to embark upon an involved discussion of the etiology of dental caries, but the peculiar relation between oral Lactobacilli and dental caries activity is of importance in a consideration of the fluorine-caries problem.

A consistent finding in the epidemiologic studies of dental caries has been the very low frequency of high saliva Lactobacillus counts in fluoride areas. These findings have been discussed in detail elsewhere,[31, 32] but, as an illustration, attention is called to the bacteriologic studies conducted on the children in Galesburg and Quincy, Ill. The Galesburg municipal water assayed 1.8 p.p.m. of fluorine, and the Quincy water was practically fluorine free, 0.2 p.p.m. One hundred eighty-six saliva specimens were cultured in Galesburg and 209 in Quincy. The calculated dental caries rates for these groups were 189 and 636, respectively. The children 12 to 14 years old who lived in Galesburg had approximately two carious permanent teeth per child, in contrast to six carious teeth per child in Quincy. Only twenty-eight, or 15 per cent, of the Galesburg children had high Lactobacillus counts, as compared with 109, or 52 per cent, of the Quincy children, so that the differences in the bacterial counts in these two cities were, roughly, of the same ratio as the differences in the caries rates. Since the Lactobacillus counts serve as a reliable index of the bacteriologic flora of caries, we have here an indication that the environmental factors of dental caries activity are modified in fluoride areas. If this is interpreted to mean that the attacking force is lacking, then the teeth may not be considered, in a strict sense, to be immune unless they are to be placed in the embarrassing position of resisting something that is not there.

How the fluorine operates to inhibit oral Lactobacilli, and very likely other bacteria which inhabit the mouth, is still

30. Lukomski, I.: Fluorine in Medicine. Condensed by J. F. Volker. Am. Rev. Soviet Med. 2:543, August 1945.

31. Jay, Philip: Fluorine and Dental Caries with Special Reference to Lactobacillus Acidophilus, pp. 63-67. In Moulton, F. R. (editor): Fluorine and Dental Health. Washington: American Association for the Advancement of Science, 1942.

32. Dean, H. T.; Jay, Philip; Arnold, F. A., Jr.; McClure, F. J., and Elvove, Elias: Domestic Water and Dental Caries, Including Certain Epidemiological Aspects of Oral Lactobacillus Acidophilus. Pub. Health Rep. 54: 862, May 26, 1939.

a matter of speculation. Since fluorine is not excreted in the saliva, the action is not direct. A possible explanation is that trace amounts of fluorine on the oral surface of the enamel influence the character of the bacterial plaques on the teeth. It will be recalled that large subcutaneous doses of fluorine did not inhibit caries in rats, whereas fluorine fed by mouth was quite effective. This suggests that the fluorine must come directly in contact with the bacterial flora of the tooth in order to prevent caries activity. Fluorine is an enzyme inhibitor and, when it is present in sufficient strength, inhibits bacterial growth and acid production in the test tube. Whether the fluorine in dental enamel exerts a similar influence in the mouth is not known.

Summary

It is definitely established that fewer carious dental cavities occur in persons continuously resident in fluoride areas during the first eight years of life than in persons residing in fluoride-free areas. Their teeth contain more fluorine than the teeth of persons in fluoride-free areas and Lactobacilli do not flourish in their mouths. There is some indication that fluoride, topically applied, may reduce the incidence of dental caries in children. From a public health standpoint, the treatment of domestic water with fluoride appears hopeful. Studies now underway should determine the efficacy of this type of treatment. Should the treatment of public water supply prove beneficial, children in rural areas might be benefited by internal medication with doses of sodium fluoride comparable to the amounts ingested in fluoride areas, or about 2 mg. daily, as suggested by McClure.[16] On the basis of information now available, the use of fluorides in dentifrices or mouthwashes is not justified.

TRADE AREAS AS PLANNING UNITS

John T. Fulton, D.D.S., Washington, D. C.*

A publication of the U. S. Department of Commerce, in discussing market analysis, says: "... generalizations about the size, location, or character of the possible market for any product are dangerous. . . . The only sound, sensible way . . . is to test, secure the facts and consider all of the factors involved."[1] That such advice has implications for the administrator of public health dental programs is borne out by recent deliberations of experts in the field,[2] who concluded that the available data are meager, clearer definitions of dental problems imperative and improved technics to obtain data desirable.

In an effort to establish better baseline data in Connecticut, I have found trade areas, rather than political subdivisions, to be a more efficient study unit. A trade area, in the present use of the term, may be defined as a shopping center to which the bulk of the residents

*Former Chief, Division of Dental Hygiene, Connecticut Department of Health; at present, Dental Services Adviser, Division of Research in Child Development, U. S. Department of Labor.

1. Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce: Check List for the Introduction of New Consumer Products. Economic Series No. 41. Washington: U. S. Government Printing Office, 1945, p. 1.

2. Institute on Dental Health Economics: Committee Reports. Ann Arbor: School of Public Health, University of Michigan, 1944.

within a well-established periphery gravitate to trade. A brief discussion of the reasons for its use, source material and possibilities seems in order.

A survey of dental manpower in the state[3] revealed that, with few exceptions, dental offices are located in communities which contain a considerable variety of business establishments and which are centers of trade. As many towns have no dentists practicing within their jurisdiction, it was essential to determine where people from such communities went for dental service and what sort of patient-load such trips produced. It has been shown that a wide difference exists in the movement of buying power "from where it lives to where it spends" and that consumer purchases show a marked degree of concentration at certain points.[4] As dentists, apparently, also are located at these points, it is reasonable to expect a close relationship between the movement of buying power and dental care.

It is known[5] that the areas which feed trading centers do not conform necessarily to town or county lines. State experts on resources and trends[6] support the view that political boundaries are least among the many factors that determine the direction in which people go for shopping purposes. As the population does not follow political subdivisions in its trading habits, there is little reason to assume that it follows them in seeking health services. Predicating public health dental studies on trade areas, therefore, seems to be a logical procedure.

The accompanying map, showing the trade areas developed for the studies, was designed by the research staff of the Connecticut Development Commission. The resource material included data on distribution and trends of population,[7, 8, 9] wholesale and retail business,[10, 11] manufacturing,[12] traffic flow,[13] market analysis[14] and Chamber of Commerce surveys and consumer reports.[15] Although material of this kind is readily available, the technics of applying the data are seldom possessed by public health workers. The agencies having trained personnel in this field can define

3. Fulton, J. T.: Dental Manpower in Connecticut. Connecticut D. A. Bull. 21:42, December 11, 1944.

4. Jones, Lincoln: Yardsticks to Guide Sales Efforts. Modern Packaging 13, January 1940.

5. U. S. Department of Commerce: An Aid for Analyzing Markets in Connecticut. Washington: U. S. Government Printing Office, 1932.

6. Connecticut Development Commission, State Office Bldg., Hartford.

7. Bureau of the Census, U. S. Department of Commerce: 16th Census of the United States, 1940. Population, 17 vols. Washington: U. S. Government Printing Office, 1942, 1943.

8. Connecticut Development Commission: Population Distribution in Connecticut. Resources and Trends Study. W.P.A. O.P. No. 465. Hartford: Connecticut Development Commission.

9. Wells, R. G., and Perkins, J. S.: New England Community Statistical Abstracts. Ed. 3. Boston: Bureau of Business Research, Boston University College of Business Administration, 1942.

10. Bureau of the Census, U. S. Department of Commerce: Census of Business, 1935. Retail Distribution, 6 vols. Washington: U. S. Government Printing Office, 1937.

11. Bureau of the Census, U. S. Department of Commerce: 16th Census of the United States, 1940. Census of Business, 1939, 5 vols. Washington: U. S. Government Printing Office, 1941, 1942.

12. Bureau of the Census, U. S. Department of Commerce: 16th Census of the United States, 1940. Manufactures, 1939, 4 vols. Washington: U. S. Government Printing Office, 1942.

13. Connecticut State Highway Department: Traffic Flow Maps. Hartford, Conn.: State Office Building.

14. Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce: Commercial Survey of New England. Domestic Commerce Series, Nos. 24, 26, 28. Washington: U. S. Government Printing Office, 1929, 1930.

15. Personal communications to the author, 1944.

Trade areas and trading centers in the state of Connecticut. Counties are shown in larger type and main trading centers in smaller type. Source: Connecticut Development Commission. Map prepared by the Committee on Economics of the American Dental Association.

the areas more accurately, and their aid should be enlisted.

Examination of the map suggests the areas in which planning by the classical pattern of political subdivisions might go astray. In many instances, the trade boundaries cut across towns. This tendency is particularly true of thickly populated places or of towns equidistant between large trading centers. Some towns contribute sections to three different areas. Much variation appears in counties, all or parts of several trade areas being contained within the limits of a single jurisdiction. Trade boundaries also cut across state borders. No less than ten towns do the bulk of their trading in neighboring states, with an undetermined amount of shopping of this sort taking place in many of the other border towns as well. No doubt desire for health services, which would seem to follow trade habits, transcends state lines also, particularly if the required service is not readily available in the local situation.

Study of a trade area map will suggest many possibilities that are thought-provoking. As a case in point, the dentist-population ratio of Litchfield County is 1:1,619. The ratios for the four trade areas in this county are 1:983; 1:1,632; 1:1,915, and 1:2,239. Obviously, any delineation of dental manpower on a county basis here will prove misleading. Although an administrator may consider the county ratio as equitable for his plans, he finds through examination of the trade areas that variations exist which demand investigation of many other factors. Undoubtedly, the influence which these variables exert on the dentist-population ratio must be taken into account when instituting or improving a program. It would seem possible to start a clinic in this situation which would be theoretically adequate for the needs, yet, depending on location, be inactive or overwhelmed with demands for service. The same considerations might hold true for the placing of field personnel. The establishment of a field headquarters in an area that does not correspond with the trading habits of the people would result in a situation in which the worker visits persons whose health services are rendered in a center far removed from the worker's knowledge and influence.

Although there may be features of the trade area planning unit which do not fit every situation, experience so far indicates that the trade area planning unit provides an improved technic for accurately defining public health dental problems. An economist has recently said, in criticizing certain market analysis methods: "They do not reach the bottom of the problem since they do not derive the demand for a product from a systematic analysis of the probable purchasing plans of all the various types of customers."[16] In principle, this statement might well apply to our public health efforts. We lessen our impact because of the lack of "systematic analysis" of the problem. Investigation on the basis of trade areas appears to be a good tool in establishing significant base lines.

16. Leontief, Wassily: A New Approach to the Problem of Market Analysis. Am. Management A., Marketing Series No. 59.

FURTHER TESTIMONY FROM HEARINGS ON DENTAL RESEARCH AND GRANTS-IN-AID-BILLS. IV

DR. MEAD, *continuing:* We feel that that is why this program of the American Dental Association is so good. It is practical. It is not theoretical and it allows us to go along carefully and expand as conditions permit.

We were asked yesterday about the advisability of amalgamating these two bills. The preparation of these bills took considerable time. They were gone over carefully. They were cleared through all the different departments of the American Dental Association and with all the committees and people involved in this bill, and finally two bills were introduced which were satisfactory to everybody in their initial stage.

We feel that we would prefer to see the two bills considered separately because of the fact that they both contain a provision for an advisory committee. The American Dental Association, of course, is insistent upon an advisory committee because of our experience with other governmental agencies in the past without any such plan, where we do not get the efficient dentistry that could be had with this plan. I think that is seen by everybody and has, apparently, been agreed to by everyone.

For the research bill, the type of person on that advisory committee is definitely different from one on the dental care committee, because a research man does not know as much about the distribution of dental care as a man who is interested in practical dentistry, who has had this experience, so we feel that there should be two advisory committees and we at all times try to convince the Surgeon General of this.

But we do not want to tie the hands of the Surgeon General in any way. We would be willing to have an amendment in the bill that would allow a provision that the Surgeon General, at his discretion, could have, with the passage of both bills, one or two committees as he finds best, for the use of these bills. We, of course, insist upon the same type of set-up that we have in each of these advisory committees and we would try to prevail upon him to give us the two committees, but we would leave that in his hands.

We feel that we not only are interested in the passage of these bills through the Senate, but it will be necessary for us also to argue these bills through the House. We are informed by our friends there that they feel we had best keep the bills separate and consider each bill upon its merit. From the way we feel about it and, we think, everybody else feels about it, there is really justification for both of these bills. They are integral parts of a plan, and they should be passed.

THE CHAIRMAN: Doctor, may I interrupt you? There is a possibility that there may later be a bill to provide, with a rather wide scope, for research. It may be in the field of national defense and in the economic field and also it may be in the health field, and all these various research efforts may be combined in a single bill. If that were to occur, would you see any objection to the dental research bill perhaps being put in the same general category, provided dental research is still recognized as having some independence in character, as this research bill contemplates?

DR. MEAD: That would be a little difficult to answer, but offhand I would see no objection, with the provision—we are interested primarily in an advisory committee with a preponderance of dentists upon it, so that we can get the most efficiency out of dentistry. The reason we are so interested in that—we are now going into all the departments, we have had to go into each of the different services to try to correct many of the inequalities that have existed for dentistry and we feel that had that been taken care of in the beginning, it would not have caused us so much trouble. Everyone is interested in his own group. Physicians are interested in medicine; dentists are interested in dentistry. Each group has to fight for itself. There is no one who knows as much about dental needs as the dentist himself. That is the reason we are so insistent upon an advisory council.

With that provision, I would say that we would be most safe if we get the same set-up. We need our own central institution, such as we have planned at Bethesda, so that we may have research carried on there in connection with the other localities where they distribute the research plans.

I think we could answer that a little later along those lines as it comes up.

I should like to go along with the testimony that we are to present, and I should like to call on Dr. Leslie M. FitzGerald, of Dubuque, Iowa, who is chairman of the committee on dental economics of the American Dental Association, who will be the first speaker.

TESTIMONY OF DR. LESLIE M. FITZGERALD, CHAIRMAN, COMMITTEE ON ECONOMICS, AMERICAN DENTAL ASSOCIATION.

DR. FITZGERALD: Mr. Chairman, Dr. Mead, other distinguished guests: I am Dr. Leslie M. FitzGerald, a practicing oral surgeon of Dubuque, Iowa, and chairman of the economics committee of the American Dental Association.

Because an understanding of recent de-

velopments in dental practice is so pertinent to the point of view with which this bill must be examined, I should like to present a brief statement of the milestones in the development of scientific dentistry. Any one who wishes to initiate and proceed with detailed planning to improve the dental or mouth health of the people of the United States must realize that, as a science and a profession, dentistry is young, but growing vigorously in its scientific accomplishments.

Beginning with an inheritance, at the close of the War of the Secession, of a mere mechanical interest in filling, extracting, and replacing teeth, certain dentists by the close of the last century were stimulated to do something about the infected, disfiguring, and irregular teeth in children's mouths. For the first time, dentists became seriously interested in more than a tooth: they become interested in the mouth behind the tooth, in a good-appearing and efficiently working set of teeth in that mouth.

In 1912, dentistry was severely criticized by the other health professions for practices which permitted infected teeth to remain in patients' mouths, where they might affect other parts of the body. Out of the efforts to adjust dental practice to a health service, the pre-clinical medical courses, such as physiology, histology, pathology and biochemistry, were added to the curriculum of dental students. Dentists, for the first time, began to consider seriously the patient behind the mouth.

In 1935, some of you, or your predecessors, assisted in the passage of a National Social Security Act, which indicated to American dentists clearly that an assurance of health, including dental health, was becoming one of the widespread demands of the people of this country as a part of security. Dentists became more seriously concerned about the community behind the patient and about the plans which the dental profession needed to make in order to meet the growing demands for dental health in a changing social order. The consideration of broad social measures by Congress appears to confirm the previous expectancy of the profession.

Accompanying the achievement of these milestones in dental practice are the milestone activities of organized dentistry. I should like to point out just four of them. In 1920, the American Dental Association organized a council for dental education. This council, in its efforts to promote a better type of educational preparation for dentists, has fostered the scientific reorganization of a total of thirty-seven out of thirty-nine dental schools in the United States and their complete affiliation with well-known universities where postgraduate and graduate study are developing rapidly.

In 1928, a dental-research program for the improvement of dental materials and of the technics for handling them scientifically was established with the cooperation and financial support of the American Dental Association at the National Bureau of Standards. The results, evaluated on the basis of improvement in practice, have been dramatic.

In 1930, a Council on Dental Therapeutics was organized to prevent exploitation of the public and of the profession through unscientific drugs and nostrums. Admittedly, there still is a tremendous need for dental research. Yet the council is helping to develop practices that may lead to a much more adequate control of dental diseases with the aid of biological, bacteriological and chemical research in the laboratories of the National Institute of Health and of the laboratories of dental schools and dental graduate research centers.

In 1942, the American Dental Association created a coordinated group, the Council on Dental Health. Its task is to serve as a planning group and to assist in the development of broader programs of dental health.

I am submitting this review of the improvement in dental education and practice and emphasizing these four activities of the American Dental Association to show you rather concretely how rapidly and recently has been the development of scientific dentistry and its assumption of a place among the health sciences. With this rapid development have come certain problems whose solution would be aided by the passage of bill S. 1099.

Thank you.

THE CHAIRMAN: Thank you very much, Doctor.

DR. MEAD: I should like next to call on Dr. Kenneth A. Easlick, of Ann Arbor, Mich., who is director of the department of children's dentistry at the University of Michigan.

TESTIMONY OF DR. KENNETH A. EASLICK, ASSOCIATE PROFESSOR, OPERATIVE AND PUBLIC HEALTH DENTISTRY, UNIVERSITY OF MICHIGAN.

DR. EASLICK: As Dr. Mead has indicated, I am from the University of Michigan. I am associate professor of operative and public-health dentistry there.

I should like to discuss those features of bill S. 1099 which deal particularly with dental health education and with the education of personnel to administer dental programs.

I hope that you will keep in mind, as I present this formal statement, the review of the improvement in dental education and practice already presented by Dr. FitzGerald, along with the activities of organized dentistry. It indicates clearly how rapid and recent has been the development of scientific dentistry, as he said, and its assumption of a place among the health sciences. I hope to point out the problems resulting from this rapid development which bill S. 1099 will help to solve.

In the first place, I should like to speak to the need for dental-health education.

It was pointed ont by a psychologist at the Dental Health Economics Institute a year ago

at the University of Michigan, an institute in which dentists from twenty-six states participated, that people neglect dental care because they have not learned that dental health is so essential that it must be purchased, or because they have an unfounded fear of dental service. This bill should assist in correcting these attitudes.

People need to be disabused of incorrect information, much of it still folklore; they need to learn, and they need to be stimulated to follow scientific dental health habits.

I should like to cite a survey reported by Dr. John W. Knutson,[1] United States Public Health Service, of the elementary schools of Waynesboro, Pa., a city of approximately 10,000 people. I should like to cite this survey to illustrate some of the possibilities of a dental health education program.

In 1931 a dental health education and stimulation program was begun in the Waynesboro, Pa., schools. The percentage of children receiving dental care rose from 24.2 per cent in 1931-1932, the school year, to 87.8 per cent in 1938-1939, as a result. The parents and teachers were motivated to care for the children's dental needs, and the dentists were stimulated to allocate a larger proportion of their time to child patients.

I should like to say a few words now about the need for training of dental personnel. An increase in the quantity and an improvement in the quality of dentistry for children undoubtedly will result if this bill is enacted into law. Realizing that operative care has to start as early after cavities begin as is practical (and 50 per cent of the group 2 to 3 years of age already may have cavities[2, 3]) and realizing that special technics are required for the care of the first teeth and the young permanent teeth in growing jaws in order to prevent serious dental disease, the Council on Dental Education of the American Dental Association, in 1941, added a course on dentistry for children to the required courses in the undergraduate dental curriculum. Obviously, many postgraduate courses must be provided to give adequate training in dentistry for children to the older dentists now in practice.

A survey of the need for dental care in the city of Detroit[4] in 1935-1936, showed that but 7.1 per cent of the younger age group of white children, the 3- to 5-year-old group, had been to a dentist during the year, as compared to 31.5 per cent of the 15- to 19-year-olds. To add to an appreciation of the problem of dental care for children, a survey last year of the attitudes of dentists in two sections of Minnesota[5] revealed that not much more than 30 per cent of the dentists felt qualified or willing to accept small children as patients.

If the definition of actual dental health needs in Michigan and the estimate of the average dentist's time required to provide necessary care are correct, then Michigan would need a 60 per cent increase in available dentists to start an immediate program that will provide such care for the children for 3 years of age through high school. If a program, on the other hand, to provide complete dental health services for the 3-year-olds in Michigan were begun this year and continued for a fifteen-year period by the yearly addition of a new 3-year-old group each year, at the end of the fifteen-year period, instead of needing a 60 per cent increase in dentists, eight of the present available dentists would be left to provide care for adults.

To test the validity of these conclusions in Michigan, dentistry urgently needs the provision for administrative research the bill S. 1099 affords. Those who plan dental programs scientifically for the future, programs which assure that public funds are spent economically for the maximum in health benefit, should have crisp information in twelve areas of basic data:

1. Population facts that deal with the concentration of people by geographical location, race, income, family, age and trade areas.
2. The effect of family income on dental needs and ability to provide for them.
3. The most scientific evaluation possible of the measures available for the reduction and treatment of dental needs.
4. A most careful and scientific definition of the dental services essential to maintain the total health of the recipient.
5. An accurate report in terms of the defined health services of the average dental needs of a large population.
6. The average operating time in hours to provide these services.
7. An accurate census of denfists and their technical auxiliaries by age, distribution and specialization.
8. An estimate of the best methods to increase the productivity of dentists.
9. Factual information about the psychologic blocks to dental care.
10. A summary of the accumulated experience in conducting dental programs.
11. Some experience with the financing of dental programs.
12. Technics for the evaluation of the results achieved by dental programs.

Dentists who secure and analyze such data and organize programs require specialized graduate training, training which is not provided in the undergraduate teaching of dentistry. As the recent report of the committee on professional education of the American Public Health Association[6] points out, the Public Health dentist should have the following qualifications: Graduation from an ac-

1. Knutson, J. W.: Evaluating Dental Health Program. Public Health Reports 57:1287, August 28, 1942.
2. Morris, E. W.: Utilization of Community Resources in Health Program. J.A.D.A. 26:493, March 1939.
3. The Murray and Leonie Guggenheim Dental Clinic Annual Report, 1940.
4. Britten, R. H: Study of Dental Care in Detroit, Mich. J.A.D.A. 25:981, May 1938.
5. Jordan, W. A. Dental Manpower of Minnesota in the Postwar Period. Unpublished thesis, June 1945.
6. Proposed Report on Educational Qualifications of Public Health Dentists. Am. J. Pub. Health 35:48, January 1945.

credited dental school; sufficient training in public health methods to fit himself in a health department and to administer a bureau; specialized training in the technics of public health dentistry, and training in or information about dentistry for children, current dental research, laboratory diagnosis and health education technics.

I should like to close my formal statement with this observation: I have received requests during the last two months to supply five state dental directors who have this type of training. None is available.

THE CHAIRMAN: Any questions, Senators?

SENATOR AIKEN: I think, Mr. Chairman, Dr. Mead told us yesterday that Dr. Easlick would tell us why more men and women do not undertake to acquire a dental training. Perhaps he did so before I came in.

DR. EASLICK: Senator, I don't have a very objective answer, as you probably would suspect. We do have a survey that has just been made of the dental school population at the University of Michigan. From that, we may draw some objective answers.

I think, in the first place, you must remember, as has been pointed out this morning—before you came, perhaps—that dentistry is a new profession as a profession, as a scientific health profession. People generally do not realize how scientific it is. They have notions only from earlier times about what constitutes modern dentistry.

According to this survey, many of the students came from homes of modest family incomes, and they came from the smaller communities. The cost of the dental course is quite an item for students, particularly students who come from homes which have modest family incomes. That perhaps is one deterrent from admissions into schools. The tuition per semester for schools may range from $100 to $200 or better. Instruments and supplies required during the course may amount to from eight hundred to a thousand dollars. Added to that, of course, is maintenance for one's self while in school.

According to this survey, too, many of our dental students have previously applied to a school of medicine for admittance. Medicine for most students, I think, is more glamorous. Certainly, medicine draws students from higher income levels than does dentistry.

In talking with young people about the possibility of the practice of dentistry as a career, I have often had expressed to me an abhorrence of this notion of working in a person's mouth. Of course, that is something for education to correct. At any rate, I think that high-school students apparently have not learned, through the people who are doing guidance work, how desirable dentistry is, how attractive it could be as a profession.

Probably that is about all I can say in answer to your question.

SENATOR AIKEN: That is about all I expected you could say.

THE CHAIRMAN: Any other question?

SENATOR AIKEN: No.

THE CHAIRMAN: Thank you very much, Dr. Easlick.

DR. MEAD: I should like next to introduce Dr. Fred Conrad, from Tallahassee, Fla., who is president of the Florida State Dental Association and who will talk to you from the viewpoint of the state organizations in regard to this problem of dental care. Dr. Conrad.

TESTIMONY BY DR. FRED O. CONRAD, PRESIDENT OF THE FLORIDA STATE DENTAL ASSOCIATION.

DR. CONRAD: I am Dr. Fred O. Conrad, president of the Florida State Dental Association.

Much of the discussion on Senate bill 190 and Senate bill 1099 has centered around the national aspects of dental research, dental health, education, and dental care. I should like briefly to discuss some of the phases of this legislation which are of deep concern to all citizens at the level of the state and community.

As president of a state dental society which has given consideration for many years to state and community dental health programs, I should like to urge the committee's support for the passage of these two bills. Senate bill 1099 will permit the official health agencies of state and community to receive federal aid. This is invaluable in providing asurance that the particular needs of the state and community will be given consideration.

In our state health department, for example, we have a children's program whose effectiveness is greatly hampered by a lack of facilities. In addition, there is a great necessity of knowing more about the technics of providing dental care more effectively and more extensively for the younger age groups, where prevention and control would be most productive. Senate bill 1099 makes such aid possible and, as previous witnesses have indicated, there is a desperate need for such help in every state of the country.

These bills have had the best thought of leaders in the dental profession, men whose training, skill, and experience would be expected to provide a scientific solution for this great problem. These bills have the active support of the American Dental Association and, as president of one of its constituent societies, I can assure you that these bills will have support in the states and communities as well.

The dental profession of the State of Florida welcomes the opportunity to make its views known and also welcomes the opportunity to take part in such a far-reaching program for the improvement of the national health. The dentists of Florida are glad to express their solidarity with the American Dental Association and to urge this committee to make a favorable report on these bills.

(To be continued)

THE JOURNAL *of the*
AMERICAN DENTAL ASSOCIATION

Harold Hillenbrand, D.D.S., Editor
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DENTISTRY IN WARTIME GERMANY

The once secret reports of bombing targets in Germany have now been released by the federal government. In these reports, as well as in those made by investigators who followed closely upon the victorious armies, will be found a rather complete description of dental education, practice and technics in Germany. These reports are produced almost in their entirety in another part of this issue.[1]

Many conclusions can be drawn by readers from this story of destruction, but there will be almost universal agreement on these obvious facts. The dental military organization of the Germans was a far cry from that which was mobilized in this country. Dental education, whatever it was a decade or more ago, has been mercilessly sacrificed to the prosecution of the war. Dental technics, though sometimes well-born of improvisation and shortages, do not begin to match those in the United States. Knowledge of prevention and control of dental disease has not yet touched the point this country reached ten years or more ago. The final conclusion is inevitable: the dental profession in Germany is confronted by an enormous task of rehabilitation and reconstruction which may take a generation or more to complete.

GENERAL MILLS RETIRES AS CHIEF OF ARMY DENTAL CORPS

Maj. Gen. Robert H. Mills, chief of the U. S. Army Dental Corps during the difficult period of World War II, retired last month after thirty-seven years of active service. He was succeeded by Col. Thomas L. Smith, former Theater Dental Surgeon for the European Theater of Operations, who was named brigadier general on assuming his new post.

During his long career in the Army, General Mills witnessed the establishment of a separate Dental Corps and its growth to a size unprecedented in history. Much of

1. See page 409.

this final growth was achieved under his direction, for he had the tremendous task of mobilizing more than thirteen thousand dental officers, almost a fifth of the country's dentists. The great problems of supply for posts and stations in every part of the world also came generally under his jurisdiction. Under the intense pressures of global war, the Army dentists had the enormous job of making hundreds of thousands of men and women dentally fit for active service. This task was accomplished and certainly played a considerable part in the final victory. It will long remain to the credit of Army dentists and American dentistry. General Mills' share in this work was recognized by his promotion to major general, the first dentist in history to achieve that high rank. On his retirement after such service, General Mills takes with him the good wishes and the thanks of American dentistry.

After the first World War, there was a major reorganization of the Army to correct conditions and deficiencies noted during the period of combat. The second World War has also revealed shortcomings in the organization of the Dental Corps—shortcomings which often interfered sharply with the ability of dental officers to render needed and efficient services. These defects should be corrected now in the course of the reorganization which is presently being discussed in Washington. The Dental Corps should be given the organization, the authority and the personnel needed to do a job that may reach very large proportions if universal military service becomes mandatory.

General Smith, as the new chief of the Dental Corps, can count on the continued cooperation and vigorous support of the American Dental Association in achieving this status for the Army Dental Corps.

INCOME TAX CREDIT FOR DENTIST'S CHARITY PRACTICE

With the annual experience of income tax deadlines only two weeks past, dentists will welcome a proposal recently introduced into Congress by Representative Clare Boothe Luce, Connecticut. This bill, H.R. 5296, if enacted, will provide an additional deduction from income taxes for all dentists, physicians and surgeons who devote some of their services without charge to worthy persons and enterprises. The method of computing such time and the proof required will be subject to regulations prescribed by the Commissioner of Internal Revenue. Credit will be given "equal in terms of percentages to that portion of (the dentist's) time each year which is devoted to charity, free clinic work and/or public research work."

The contributions to charity made annually by dentists and physicians in the routine course of their practice are enormous. Mrs. Luce states that "surveys as to the amount of these unpaid services indicate that the percentages range from around 30 to 45 of all treatment given. This is a direct contribution on the part of the physician, surgeon or dentist to the public welfare." Everyone has recognized the invaluable part such uncompensated service has had in raising human standards of health and happiness in this country. On occasion, this charity has been saluted in the song and story of the hard-working and devoted practitioner. Only rarely, however, has it been rewarded in the very practical form which Representative Luce suggests in her bill. The passage of the measure will undoubtedly bring pleased smiles when the next official communication from the Department of Internal Reve-

nue comes to hand. But whether it passes or not, every practitioner knows that he will go on giving his services to the full measure of his ability to those who really need them.

Representative Luce also makes this point in a statement which accompanied the bill on its introduction. In discussing various proposals to provide a governmental program of health care, she says:

> None of these proposals is a logical development of the American system of recognizing, promoting and rewarding individual choice and achievement. In our earlier history, pioneer medicos were rewarded for their frequently ill-paid devotion by a very special place in the community, high respect from their fellow citizens and patients, and payments in lovingly prepared delicacies where cash was scarce. Those times have largely vanished. To become a doctor, a surgeon, a dentist, now requires some eight or nine years of unremunerative and expensive schooling. Until he has completed all this, usually by the time he is 29 or 30, the doctor cannot even begin to earn his own bread and salt, much less begin to repay himself for the costs of learning his profession.

THE ANNUAL CRUSADE AGAINST ANIMAL EXPERIMENTATION

The annual crusade against animal experimentation is again under way and will provide the desired stimulation for the circulation of certain newspapers as well as for those misguided persons who seek this strange emotional outlet. It seems odd that even in the present day the undeniable advances that have been made through animal experimentation in laboratories and schools must be matched against the sensational and distorted presentations of one segment of the press. The unreasoning opposition to any and all types of animal experimentation, however, makes even such comparisons useless. Every emotion-baiting device is enlisted to misrepresent the realities and values of animal experimentation, and many who have never taken the time to examine the issues are won over on the basis of a sentimental affection for animals which all well-meaning persons possess.

These annual crusades cumulatively have the power gravely to hamper biologic, dental and medical research, particularly when carried to the point of serious legislative proposal. In Massachusetts and in the District of Columbia, restrictive bills on animal experimentation are pending. In New York, a similar bill has been met by a forthright statement of opposition from the Dental Society of the State of New York.

There is need for countering such crusades with effective education of the public on the real issues. Certainly in the rich annals of experimental science there will be found sufficient material to convince the open-minded of the necessity and benefits of animal experimentation. A national organization to provide such education in a continuing program is now being formed. Dental schools and other dental groups will do well to lend their support to this agency before irreparable harm is done to the progress of dental research and practice.

REPORTS OF COUNCILS AND COMMITTEES

COMMITTEE ON NATIONAL MUSEUM AND DENTAL REGISTRY

SERVICES OF THE REGISTRY OF DENTAL AND ORAL PATHOLOGY

In keeping with the postwar plans of the American Registry of Pathology, the Committee on National Museum and Dental Registry is emphasizing the many services of the Registry of Dental and Oral Pathology. This Registry is sponsored by the American Dental Association and, together with the others in the various fields of medicine, is administered at the Army Institute of Pathology, Washington, D. C. Of major importance to the practitioner of dentistry, particularly the exodontist and the oral surgeon, is the biopsy service of the Registry. Those who use this service not only provide the Registry with material for its files, but also receive a histologic diagnostic service which in most instances helps to simplify the problem of oral diagnosis. The ultimate value of material so received can only be fully realized when all of the activities of the Registry are understood. Of particular importance are the loan collections of microscopic slides, kodachromes and lantern slides. These activities will be fully explained in subsequent reports.

It must be emphasized that the purpose of rendering such histologic reports is not to infringe on the functions of the local pathologic laboratory, but rather to provide this service in areas where such an aid is not readily available, and to those local laboratories which do not have a competent dental pathologist. In this latter instance, the contributor is urged to request that the material be forwarded to the Registry for consultation. Material of unusual interest may be circulated, by the Registry, to its civilian consultants. The consultants include some of the better known dental pathologists throughout the country. In all instances, the contributor is forwarded a digest of the analysis so received, provided such information assists in an understanding of the case.

It is impossible to overemphasize the value of tissue analysis in oral diagnosis. Often an obscure diagnosis will become apparent, thus enabling the operator to plan a more complete treatment. The following points are important in taking an adequate and accurate biopsy:

1. If the lesion is small and surgical removal is indicated, remove the entire lesion.

2. Select a site on the lesion that will give a true picture of the active process. If demonstration of organisms seems indicated, select a site where the process is in its earliest stage.

3. Do not paint the surface with iodine. Seventy per cent alcohol should be used as a surface antiseptic.

4. Do not use an anesthetic which will "freeze" the immediate area.

5. Be sure that the specimen includes underlying tissue and adjacent normal tissue for comparison.

6. Do not use electrosurgery for taking the specimen.

7. Immediately after removal, place the tissue in twenty times its volume of 10 per cent formalin (4 per cent formaldehyde). After twenty-four hours, wrap it in gauze saturated with fixative, place in a widemouthed bottle and mail to: The Director, Army Institute of Pathology, Washington 25, D. C.

At the present time, the Registry files contain over 5,000 cases. It has long

been our desire to analyze critically this valuable material with the hope of shedding light on some of the more obscure lesions. This hope has now become a reality. The first fellow in dental and oral pathology will report shortly to the Army Institute of Pathology for a period of intensive training under the director of the Army Institute of Pathology and the pathologist to the Registry of Dental and Oral Pathology. During this period, it is hoped that much will be accomplished in research as related to dental and oral pathology.

Many men, as evidenced by the ever-increasing number of regular contributors, have come to depend upon the Registry for aid in the diagnosis of oral lesions. We believe that this represents a healthy trend toward a more scientific approach to the problems of the practicing dentist.—*Lt. Col. Joseph L. Bernier (DC), Secretary and Pathologist to the Registry.*

COMMITTEE ON ECONOMICS

VETERANS ADMINISTRATION FEE SCHEDULE

Maj. Gen. Paul R. Hawley, Acting Chief Medical Director of the Veterans Administration, announced approval on February 11 of changes recommended by the Committee on Economics of the American Dental Association in the agency's schedule of fees for dental service. The adjustments in the schedule and recommendations concerning its use involve major changes from previous policy.

The Veterans Administration has agreed to use the approved schedule as a control instrument, and to permit its branch and regional (state) dental chiefs to negotiate adjustments with state dental societies to meet recognized differences in fees as they may exist in typical practice within each state. At the present moment, the Veterans Administration does not contemplate establishing differentials between localities or areas within individual states.

Dr. Milburn M. Fowler, Assistant Medical Director, in charge of dental service, stated:

> The expansion of the dental program is a matter which at present can be only estimated. I believe, however, that the load of outpatient dental treatment will be from seven to eight times greater than the peak of World War I cases. This estimate is based on the fact that we will have nearly 20 million potential beneficiaries, of whom approximately 80 per cent will be eligible for dental benefits upon application. We further estimate that approximately 50 per cent of those eligible will file either formal or informal claims for dental treatment.

Earlier this year, General Hawley approved the principle of permitting veterans their choice of practitioner. In the past, only a few dentists in each community were certified to provide dental service. In most instances, these appointments as "designated" dentists were made without consultation with state or local societies.

The Veterans Administration is now completing the drafting of instructions concerning these changes, and shortly will issue them to the dental chiefs in each state.

Under the changes approved by General Hawley, state dental societies will be in a position to assume important advisory, consultative and administrative responsibilities. Among the functions which may be involved are:

1. Negotiation and approval of a basic fee schedule to be used in providing dental service in private offices to veterans residing in each state.

2. Organization of a procedure to receive applications, review ethical qualifi-

cations and certify to the Veterans Administration dentists interested in participating.

3. Review of the ethical qualifications of dentists already certified by the Veterans Administration.

4. Review of complaints registered by the Veterans Administration concerning service rendered to patients or other questionable practices of participating dentists.

5. Liaison work in connection with procedures and relations between participating dentists and the Veterans Administration.

State societies may assign this activity to already established councils or committees or may appoint special committees to handle this work. In addition, state societies may delegate part of this work to local dental societies wherever this may be deemed practicable, such as to local societies in metropolitan areas. Dental societies have been asked to give early consideration to this project.—*Joseph E. Bagdonas.*

COUNCIL ON DENTAL THERAPEUTICS

ACCEPTED DENTAL REMEDIES

The Council on Dental Therapeutics of the American Dental Association announces the inclusion of the following articles in the list of Accepted Dental Remedies:

Penicillin and Related Preparations[1]

Penicillin Sodium Salt — Abbott, in vials containing 100,000 and 200,000 Oxford Units.

Penicillin Calcium Salt—Abbott, in vials containing 100,000 and 200,000 Oxford Units. Manufactured by Abbott Laboratories, North Chicago, Ill.

Admission of a product to the list of Accepted Dental Remedies means that the product and the methods by which it was marketed at the time of consideration were not found to be in violation of the Council's published rules. Accepted products are reconsidered periodically. The files of the Council contain information on many drugs and dental cosmetics which is available upon request, and inquiries are welcomed. — *Donald A. Wallace, Secretary.*

1. A.D.R., Ed. 11, p. 162.

COUNCIL ON DENTAL EDUCATION

REQUIREMENTS FOR THE APPROVAL OF HOSPITAL INTERNSHIPS AND RESIDENCIES*

Hospital Dental Internship

I. Definition

A hospital dental internship is a form of professional education beyond the undergraduate level which offers special opportunity for clinical experience and advanced training in dental science and practice. The dental graduate who accepts a dental internship is regularly appointed to the house staff of a general or special hospital approved for the treatment of bed-confined patients and ambulatory dispensary patients. The dental intern resides in the hospital and works and studies under the supervision of the hospital staff. The internship is a full-time service usually for a period of one year.

*Approved by the Council on Dental Education, February 26, 1946.

II. Purpose

The fundamental purpose of the hospital dental internship is to broaden the graduate's clinical experience by affording him opportunities for viewing and following throughout their clinical progress, those conditions not usually common to the clinic of the dental school and especially to enlarge his knowledge of oral and systemic relations in health and disease.

III. Training

The Council will expect the training program to be arranged so that the dental intern, by the end of his year of service, will have increased his knowledge and experience in at least the following fields:

(1) In the recognition of oral manifestations of systemic diseases.

(2) In the recognition of abnormalities and diseased conditions in the oral cavity and associated parts requiring surgical or medical treatment and in making a complete diagnosis of those diseases and disorders usually treated by the dentist in his private practice.

(3) In the evaluation of the patient's physical ability to undergo anesthesia, general or local, for oral surgery.

(4) In the employment of surgical judgment in regard to the time for and extent of oral surgery safest for the patient.

(5) In the correlation of surgical and other types of dental health service.

(6) In the differentiation of the indications and contraindications for surgical intervention of the more common abnormalities and diseases involving the oral cavity.

(7) In the understanding of the value of and indications for hospitalization for oral surgery.

(8) In the prevention of shock during or following dental operations and in the treatment of the patient when shock occurs.

(9) In the treatment of the following conditions: (a) hemorrhage associated with the extraction of teeth and with wounds occurring in the mouth; (b) abnormalities of the oral cavity, such as irregular or excessive alveolar process, exostosis and torus palatinus; (c) acute inflammatory conditions arising about the teeth and adjacent tissues; (d) chronic periapical infections and their sequelae; (e) wounds and injuries of the soft tissues of the oral cavity; (f) root fragments and foreign bodies about the alveolar process; (g) injuries to the teeth and alveolar process; (h) fractures of the maxilla and mandible; (i) dislocation, subluxation and other minor disturbances of the temporomandibular articulation; (j) benign tumors and cysts of the jaws not requiring major resection of the bone; (k) salivary duct calculi; (l) incision and drainage of cellulitis and abscesses of dental origin.

(10) In the use of chemotherapy, antibiotics and radiation therapy.

(11) In the administration of general and regional anesthesia for major and minor oral surgery.

(12) In the conduct of postoperative treatment in oral surgery.

IV. General Scope of Activities

The dental intern will be expected to assist in the care of patients and to have charge of the treatment of some patients under the guidance and supervision of the hospital staff. His experience will include examination and dental care of patients; the taking of case histories and the preparation of diagnostic charts; acting as assistant in the operating room for oral surgical operations; the performance of minor operations under supervision; attendance upon and participation in staff meetings; service in the hospital laboratories, x-ray departments and attendance upon autopsies.

V. Records

The Council suggests that hospitals

keep a record of each intern's work. Such information may be supplied to the chief of the dental service by the intern himself on special forms where space is provided for data, such as the period of time covered, the service, the number of patients admitted on service, the number of histories and oral examinations completed by the intern, the number of anesthetics given by him, the number of operations performed by him and the number in which he has assisted, the number of autopsies attended, the hours spent in the laboratories and the number of lectures, clinics and conferences attended.

VI. Status

The Council will expect dental interns to enjoy the same privileges, accommodations and perquisites provided by the hospital for interns in other services. The Council will also expect that hospitals will issue to the dental intern a certificate of accomplishment upon the completion of the internship.

VII. Hospitals Eligible for Approval

To be eligible for the training of dental interns, hospitals and sanatoriums coming under the purview of the Council on Medical Education and Hospitals of the American Medical Association must be registered and approved by that agency; and hospitals and sanatoriums not coming under the purview of that agency must be approved by the Committee on Hospital Dental Services of the American Dental Association. In either case, the hospital departments of dentistry must be approved by the Committee on Hospital Dental Services of the American Dental Association.

VIII. Application for Approval

Hospitals that desire to be approved for dental intern training should apply to the Council on Dental Education of the American Dental Association, 222 East Superior St., Chicago 11, Ill.

Hospital Dental Residency

I. Definition

A dental residency is a progressive and graduated educational experience, under hospital auspices, designed for the dental graduate who has completed a dental internship in an approved hospital, which should give opportunity for proficiency in a specialized field of practice or research and the educational background for continued development in a special field. A sufficiently prolonged and continuous period of full-time training is presupposed.

The Council will approve straight residencies and mixed residencies. Straight residencies are services of one or more years in a specialized field, following approved internships. Mixed residencies are general hospital assignments following approved internships. A mixed residency covers more than one but not all of the clinical specialties.

II. Purpose

While residencies in general are planned to train dentists for specialties, the Council recognizes that residencies can supply the need in small communities for well-trained men who will practice oral surgery, periodontia, prosthodontia, orthodontics and pedodontia in connection with general practice.

III. Staff

The Council will expect the hospital to have an organized staff of dentists. The particular specialties in which residents are being trained should be represented on the staff.

In general hospitals, the dental staff should have a definite departmental organization in the branches of dentistry in which straight residencies are offered. The director of each service should be competent in his field. He should assume direct responsibility for the training of residents.

There should be at least monthly clinical-pathologic conferences or other regu-

lar staff meetings at which histories and clinical observations in selected cases may be reviewed, particularly when autopsies have confirmed or altered the diagnosis. In addition to meetings of the staff as a whole, it is expected that departmental conferences will be conducted in which residents may take an active part to the end that the character of the service given by that department to its patients may be recurringly evaluated.

IV. Training Program

Residencies are designed primarily to meet the requirements for special practice. In all instances, the term of service should be at least twelve months and might be extended to two or more years when suitable facilities are available.

Aside from the daily contact with patients and staff, the assumption of responsibility is the most valuable aspect of residency. Consequently, as ability is demonstrated, an increasing amount of reliance should be placed in the judgment of residents, both in diagnosis and in treatment.

Residents should be given an opportunity to contribute to the effectiveness of the hospital service by some investigative work. This may take the form of research in the hospital laboratories or wards, summaries of dental literature or the preparation of statistical analyses derived from the hospital record department. Dental residents should engage in teaching activities, particularly in relation to the training of interns and nurses.

The effectiveness of a residency program depends largely upon the quality of dental supervision and teaching. It is important, therefore, that methods of instruction be employed which are best suited to the special field. Emphasis should be placed on chairside and bedside instructions, teaching rounds, departmental meetings or seminars, clinical-pathologic conferences and on demonstrations and lectures. The review of dental literature is an essential feature of residency training. Likewise, the study of basic sciences as required should be integrated with the clinical experience.

In the operative divisions, it is desirable that facilities be available for anatomic dissection and experimental surgery on animals or on the cadaver.

V. Records

It is important that all institutions approved for residencies should keep records of the experience and training of residents.

VI. Status

The Council will expect dental residents to enjoy the same privileges, accommodations and perquisites provided by the hospital for residents in other services. The Council will also expect that hospitals will issue to the dental resident a certificate of accomplishment upon the completion of a residency.

VII. Hospitals Eligible for Approval

To be eligible for the training of dental residents, hospitals and sanatoriums coming under the purview of the Council on Medical Education and Hospitals of the American Medical Association must be registered and approved by that agency; and hospitals and sanatoriums not coming under the purview of that agency must be approved by the Committee on Hospital Dental Services of the American Dental Association. In either case, the hospital departments of dentistry must be approved by the Committee on Hospital Dental Services of the American Dental Association.

Institutions desiring to be approved for residencies should apply to the Council on Dental Education of the American Dental Association, 222 East Superior St., Chicago 11, Ill. Application blanks will be furnished and arrangements made for a personal visit of inspection by a member of the Council's staff.—*Committee on Hospital Dental Internships and Residencies: W. N. Hodgkin, chairman; W. H. Archer; M. W. Carr.*

COUNCIL ON DENTAL HEALTH

PLAN TO STUDY METHODS FOR FINANCING HEALTH PROGRAMS THROUGH GOVERNMENTAL AGENCIES

The Committee on Methods of Payment of the Council on Dental Health is sponsoring a detailed study of the various methods for financing dental programs not included in the Committee's previous activities. Earlier studies on methods for financing dental care resulted in the development of a postpayment plan, now available to the profession, and an experimental voluntary prepayment plan which the Council hopes to see undertaken by one or more state or component dental societies in the near future.

This new study will cover compulsory insurance or payroll deductions, grants-in-aid to the states, foundation grants and financing methods used by departments and agencies of the federal government. The investigation will include an analysis of the activities of:

I. U. S. Department of Labor
   a. Children's Bureau
      1. Maternal and Child Health
      2. Crippled Children

II. U. S. Department of Agriculture
   a. Farm Security Administration
   b. War Food Administration
   (Office of Labor. Service for migrant agricultural workers, native and foreign.) Services provided under the War Food Administration are principally "direct" and as such will not be considered in this study. However, it is believed that some services may be classified as "indirect" and are provided through other agencies or by contract with individual dentists.

III. Department of Justice
   a. Bureau of Prisons
   b. Bureau of Immigration
   (Services under "a" and "b" are primarily "direct." However, the existence of "indirect" service programs will be investigated.)

IV. U. S. Public Health Service
   (Direct and indirect services. This study will be confined to indirect services.)

V. Veterans Administration
   (Direct and indirect services. This study will be confined to indirect services.)

VI. Federal Office of Vocational Rehabilitation
   (Funds allocated to the Division of Vocational Rehabilitation in the State Department of Education and to the state agency under which vocational rehabilitation is provided for the blind.)

VII. U. S. Civil Service
   a. Employees Compensation Commission
   (Direct services provided for federal employees injured in line of duty. Here again the possible existence of indirect service programs will be investigated.)

An analysis will also be made of pending federal and state legislation to determine how far-reaching it may be and to what extent it may affect dental service financing.

It is quite obvious that the broad scope of this study makes it impossible for the Committee on Methods of Payment to carry the study through to completion independently without encroaching upon the fields of certain other committees of the American Dental Association. In view of this, the Committee proposes to enlist the assistance of other committees in the accomplishment of this assignment. No phase of this project should be a duplication of other committee activities, but rather a utilization or supplementation of the findings of committees engaged in related problems.

With reference to the Council's proposed experimental voluntary prepayment plan for dental care: The growing trend toward prepayment health care planning, both voluntary and compul-

sory, with an increasing interest in the inclusion of dental care in such plans, makes it extremely important that dentistry acquire some experience in this field without further delay.

Although none of the numerous compulsory health measures or cash sickness benefit proposals introduced in the various state legislatures during the past year were adopted, they did develop considerable public interest and support. With the formation of legislative study groups in a number of these states, further proposals along similar lines can be expected during the next sessions of state legislatures. Leaders in the political, labor, social, economic and scientific fields, and in many others, have been loud in their commendation of compulsory health programs. President Truman's proposed national health program and the Wagner-Murray-Dingell bill designed to implement it have aroused the interest of all thinking people in health service planning.

As a counter proposal, leaders in the medical and hospital health service fields point to the many advantages of a voluntary program under local sponsorship and control. Recent actions by the medical profession will tend to make available to a greater percentage of the population in practically all sections of the nation a broader program of health services through voluntary prepayment plans.

Dental care has captured the interest of those who are planning health programs, and it appears to be but a matter of time until the question regarding its availability to the public on a voluntary or compulsory prepayment basis must be decided. It is conceivable that the American Dental Association may soon be called upon to provide concrete plans or to pass judgment upon the merits of dental prepayment plans developed by other groups. Our inability to make a contribution of value in such an instance would be unfortunate, to say the least. Without the information and experience which can be acquired only through experimentation, the American Dental Association would be unable to speak out authoritatively on the subject.

Although prepayment plans can by no means solve the entire problem of providing adequate dental care to all of the people, they can contribute largely to its solution, if such planning is at all possible. Unfortunately, we do not know whether or not the principles of prepayment planning can be applied to dentistry. Time and experience are necessary to determine this fact as well as to indicate the type of plan or plans that can be operated on a basis satisfactory to all concerned.—*Allen O. Gruebbel, D.D.S., Executive Secretary.*

BUREAU OF PUBLIC RELATIONS

COMMENT ON THE WAGNER-MURRAY-DINGELL BILL

The full effect of the Wagner-Murray-Dingell bill cannot be measured without examining the actual wording of the sections relating to dental benefits. The following are direct quotations from Title II, Prepaid Personal Health Service Benefits (compulsory health insurance), of the Wagner-Murray-Dingell bill (S. 1606—H.R. 4730), plus comments thereon:

Lay Control

Sec. 203. (a) *"The Surgeon General of the Public Health Service shall perform the duties imposed upon him by this Act, under the supervision and direction of the Federal Security Administrator. . . ."*

In administering the Act, the Surgeon General will be supervised and directed by a lay administrator.

Sec. 203. (b) *"The Surgeon General is hereby authorized and directed to take all necessary and practical steps, not inconsistent with the provisions of this title, to arrange for the availability of the benefits provided under this title and of services and reports required by the Board for administration under this Act."*

The Social Security Board, composed entirely of laymen, is also given administrative powers under the Act.

Specialist Services

Sec. 205. (c) *"Services which shall be deemed to be specialist . . . services . . . shall be those so designated by the Surgeon General, and the practitioners . . . who shall be . . . entitled to the special rates of compensation provided for specialists . . . shall be those so designated by the Surgeon General. . . ."*

The Surgeon General will decide who may be a specialist and will determine what his fee or salary may be.

Panel Listings

Sec. 205. (e) *"The Surgeon General shall publish and otherwise make known in each local area to individuals entitled to benefit under this title the names of medical and dental practitioners and groups of practitioners who have agreed to furnish services as benefits under this title. . . ."*

Panel listings of participating practitioners will be published in each community.

Methods of Payments

Sec. 205. (g) *"Payments from the Account to general medical and family practitioners or to general dental practitioners, for services under this part, shall be made—*

(1) On the basis of fees for services rendered to individuals entitled to benefits, according to a fee schedule;

(2) On a per capita basis, the amount being according to the number of individuals entitled to benefit who are on the practitioner's list;

(3) On a salary basis, whole time or part time; or

(4) On a combination or modification of these bases, as the Surgeon General may approve. . . ."

Practitioners may be paid on a fee basis, a per capita basis or a salary basis, subject to approval by the Surgeon General.

Limitation of Patients

Sec. 205. (j) *". . . the Surgeon General may prescribe maximum limits to the number of potential beneficiaries for whom a practitioner or group of practitioners may undertake to furnish general medical or general dental benefits, and such limits may be nationally uniform or may be adapted to take account of relevant factors. . . ."*

Practitioners may be limited by the Surgeon General in the number of patients they may serve.

Collective Responsibility

Sec. 205. (l) *"In each local area the provision of general medical or general dental benefit for all individuals entitled to receive such benefit shall be a collective responsibility of all qualified general medical or family practitioners or of all qualified general dental practitioners, respectively, in the area who have undertaken to furnish such benefit."*

A "collective responsibility" is placed on all participating dentists which obligates them to provide dental benefits for everyone entitled to benefits in their area.

Payments by Patients

Sec. 210. (a) *"The Surgeon General may, after consultation with the Advisory Council and with the approval of the Administration, determine for any calendar year or part thereof that every individual entitled to general medical,*

general dental, or home-nursing benefit may be required by the physician, dentist, or nurse furnishing such benefit to pay a fee with respect to the first service or with respect to each service in a period of sickness or course of treatment. . . ."

The patient seeking dental benefits may be required to pay a fee for his "first service" or "each service" in a course of treatment.

Dental Benefits Restricted

Sec. 210. (b) *"The Surgeon General having regard for the adequacy of available personnel, may, after consultation with the Advisory Council and with the approval of the Administrator, determine for any calendar year or part thereof that general dental, special dental, or home-nursing benefit shall have such restricted content as the Surgeon General may determine: Provided that on and after July 1, 1947, the restricted content of general dental or special dental benefit shall include at least (1) examination (including x-ray survey) and diagnosis; (2) prophylaxis; (3) extraction of teeth which are considered by the dentist and an attending physician to be or likely to be injurious to the general health of the individual; and (4) treatment of acute diseases of the teeth, their supporting structures, and adjacent parts, including fractures of the teeth or jaws. . . .*"

Promised dental benefits are extremely limited in extent and vaguely described. For example, extractions are limited to teeth which a dentist *and* a physician consider injurious to the general health of the individual. The phrase, "acute diseases of the teeth," is meaningless.

This bill is now before Congress. Have you told your Senators and Congressmen what you think of it?

CORRECTION

In the article by John R. Thompson, D.D.S., entitled "The Rest Position of the Mandible and Its Significance to Dental Science," which appeared in the February issue of THE JOURNAL, several of the figures are reproduced inaccurately. The colored lines in Figures 21, 25 left, 26 right and 28 right are printed out of position so that the drawings do not conform with the written description.

NEWS OF DENTISTRY

Herbert B. Bain, newly-appointed press relations director for the American Dental Association.

Herbert B. Bain Is Appointed A.D.A. Director of Press Relations

Herbert B. Bain, formerly associated with the public relations firm of Ivy Lee and T. J. Ross of New York, N. Y., has joined the staff of the Bureau of Public Relations as director of press relations for the American Dental Association.

Mr. Bain is in charge of preparation and dissemination of news and feature articles regarding dentistry and activities of the American Dental Association to the press and radio of the nation.

Immediately prior to joining the staff of the American Dental Association, he was in charge of public relations at the Dodge Chicago Plant where B-29 aircraft engines were produced during the war.

Mr. Bain served in the infantry during World War II and is a graduate of the University of Chicago. He has a background of fifteen years of experience as a reporter and writer for daily newspapers. His most recent newspaper position was that of an assistant city editor for the *Chicago Herald-American*.

American Board of Orthodontics to Hold Meeting September 26-29

The 1946 meeting of the American Board of Orthodontics is scheduled to be held at the Broadmoor Hotel, Colorado Springs, Colo., September 26-29.

All orthodontists who desire to be certificated by the Board should obtain application blanks now from the secretary, Bernard G. DeVries, 705 Medical Arts Bldg., Minneapolis 2, Minn.

Walter Reed Hospital Reports Progress in Development of Cosmetic Hand

Maj. Charles A. Jackson, dental officer, and a staff of eleven research engineers and highly trained technicians of the Walter Reed Hospital laboratory report progress on a new type of "cosmetic" hand. Plastics of which dentures are made have been utilized to develop lifelike hands that can be worn without gloves.

Although cautioning against overoptimism, Lt. Col. Donald B. Slocum, director of the Walter Reed Hospital laboratory, says that the new type of cosmetic hand "looks like one and can be used like one."

New Dental Courses for University of Kansas City

New postgraduate and graduate courses in orthodontics were announced recently by the University of Kansas City, School of Dentistry, of which Roy J. Rinehart is dean. The first course was inaugurated on February 4, and a second class will be accepted on February 3, 1947. At present, two courses are available: graduate, in which the requirements for the degree of master of science in dentistry are met, and postgraduate, in which the prescribed work for one year leads to the award of a certificate.

The instructors in the orthodontic department of the school are: W. Wayne White, George Nagamoto, Francis M. Calmes, John W. Richmond and Donald A. Closson.

Reports Indicate Army Officers Will Keep Present Rank Permanently

Wholesale "cutbacks" in rank, which took place after the last war, may be avoided as an aftermath of this one, according to a press report in the *New York Times,* February 20. The story stated that "virtually all present officers, both regular and non-regular, now hold both permanent and temporary ranks, with the latter at least one grade, and in many instances, several grades, higher than the former."

Instead of decreeing that all officers will revert to their permanent rank immediately, the Army believes that it will be possible to let the officers keep their temporary rank. This will be possible, it was pointed out, because of the large number of officers that will be required in the postwar Army.

List Dental Patents Issued for Last Half of 1945

The following patents of dental interest have been issued by the U. S. Patent Office from August 7 to December 25, 1945. Publication will be given to additional lists as soon as they become available.

	August 7	
2,380,945	Paul F. Collins	Refractory Mold
2,380,988	James Thomas Mudler	Dental Instrument Sharpener
2,381,128	Jacob E. Laskin	Orthodontic Bracket Spring
2,381,142	Albert A. Stonehill	Dental Floss
2,381,261	Alvin F. Cota	X-Ray Film Holder
2,381,530	Joseph E. Dembenski	Sanitary Dental Floss Holder
2,381,789	Morris J. Thompson	Dental Hydrocolloid Syringe
	August 14	
2,382,189	Milton H. Wahl	Preparation of Nitric Oxide
2,382,385	Paul N. Condit	Absorbent Holder
2,382,484	Joseph Homer	Ray Sight and Film Holder for X-Ray Machines
2,382,546	David Curtis	Anesthetic Solutions
	August 21	
2,383,027	Frederic Tryfus	Carrier Means for Artificial Teeth
	September 4	
2,384,354	Henry Alfred Ernest Talley	Apparatus for Administering Anesthetics
	September 11	
2,384,712	John Turenchalk and Harry Turenchalk	Dental Floss Holder

September 18

2,385,262	David Curtis	Therapeutic-Anesthetic Preparation

October 2

2,385,786	Howard F. Brubach and Laurence R. Crisp	Apparatus for the Administration of Gaseous Mixtures
2,386,085	Byron A. Babel	Toothbrush
2,386,103	Charles E. Galley	Checking Device
2,386,104	Charles E. Galley	Jig
2,386,124	Jacob E. Laskin	Arch Bar Clip

October 23

2,387,597	Dan McLachlan, Jr.	Medical X-Ray Radiography for Locating Embedded Materials

October 30

D-142,688	Edwin D. Beebe	Design for a Combined Dental Laboratory Bench and Cabinet
D-142,689	Edwin D. Beebe	Design for a Combined Dental Laboratory Bench and Cabinet

November 6

2,388,323	Edward Henderson	Hypodermic Syringe Unit
2,388,533	William Edmondson and Wilfred Jones	Administration of Inhalant Gases
2,388,543	Gilbert A. Hoggatt	Process of Preparing Plaster Casts

November 13

2,389,063	Ervin G. Lang	Denture Prosthesis
2,389,069	Eneas G. Mascarenhas	Hypodermic Needle Grinder
2,389,101	Winthrop C. Whittemore	Denture Articulator
2,389,102	Benjamin F. Williams	Respiratory Mask
D-142,917	Richard D. Strieby	Toothbrush

November 20

2,389,355	Philip P. Goland and Charles R. Drew	Surgical Needle

December 4

2,390,137	Vance V. Vallandigham	Impression Material
2,390,138	Vance V. Vallandigham	Method of Conditioning Gel Molds
2,390,397	Frank J. Stadler	Dental X-Ray Film Identifier

December 11

2,390,710	Chester J. Henschel	Dental Engine Accessory Equipment

December 18

2,391,106	Jacob A. Saffir	Method of Making Artificial Teeth
2,391,260	Chant A. Miller	Dental Tool Sharpening Device
2,391,371	Percy Gordon Watt	Dentifrice and Toothbrush Container

December 25

2,391,651	Elizabeth E. Smith and Will O. Smith	Dental Compact

YES!
DENTAL HEALTH OF THE AMERICAN PEOPLE CAN BE IMPROVED
BLUEPRINT for DENTAL HEALTH
NO!
COMPULSORY HEALTH INSURANCE WILL NOT IMPROVE DENTAL HEALTH
YES!
THE AMERICAN DENTAL ASSOCIATION'S PLAN WILL IMPROVE DENTAL HEALTH

"Blueprint for Dental Health"

Pictured above is the cover of the new pamphlet, "Blueprint for Dental Health," which is being distributed free by the Bureau of Public Relations to members of the profession and the general public. The pamphlet compares the compulsory health insurance system proposed by the Wagner-Murray-Dingell bill with the national dental health program of the American Dental Association.

British Government Adopts Variant of Beveridge Plan

The government's version of Sir William Beveridge's plan for comprehensive social insurance passed the crucial second reading in the House of Commons on February 11 without a record vote. The new bill inaugurates what is unquestionably the broadest social security program ever undertaken by any Western country. It has been calculated that with the new bill, and on the assumption that not more than 5 per cent of the employable population will be unemployed on the average, the British government will be taking about 24 per cent of the gross income of individuals in compulsory contributions for social security and other forms of social service.

For benefits, a male employed person will pay about 92 cents weekly and his employer will pay about 77 cents weekly.

The benefits, according to American standards, may not seem high but they are high enough to make the total cost enormous in terms of Great Britain's probable national income. By 1978, it is estimated by government actuaries, the scheme will cost about 3 billion dollars, of which contributions from workers and employers and interest on the National Insurance fund will cover less than one-third. The remainder must come from taxes.

Two points in the bill that have met serious objection during debate are the treatment of self-employed persons and the exclusion of the so-called friendly societies. The self-employed must wait longer than employed persons before drawing unemployment or sickness benefits.

Californian Pleads Guilty to Illegal Practice of Dentistry

Ralph Smith, Escondido, Calif., was arrested recently on a warrant issued by the district attorney's office of San Diego County. The charge was the illegal practice of dentistry. In municipal court, Smith pleaded guilty and was sentenced to pay a fine of $100. The payment of one-half of the fine was suspended for one year on condition that Smith not further violate the provisions of the dental practice act. Smith was charged with constructing a full upper and lower denture for a patient, doing the laboratory work in his home.

Physical Standards Lowered by Army to Get 75,000 Rejectees

Lowered physical standards have been announced by the War Department in order to meet current manpower needs. Under the new requirements, it is estimated that 75,000 men who have been rejected will now be eligible for military service. The men will be obtained from the pool of 1,250,000 non-fathers from 18 through 25 years of age. They are classified largely in 4-F but also include some classes in 2-A-L, 2-A-F, 2-C-L and 2-C-F.

Dentist Gives 3,000 Volumes to Jewish National Library

The dental section of the Jewish National and University Library is now the most important of its kind in the Middle East, according to Professor G. Weil, director of the library. This development is due to Henry I. Wachtel, New York dentist, who has donated more than 3,000 volumes on dentistry to the library since 1931. Dr. Wachtel has also been instrumental in securing for the library substantial gifts of books and magazines on dentistry from other donors.

Appointment of Dental Officers to Regular Army

Under the provisions of Public Law 281, dental officers are offered a greater inducement to accept appointments in the Regular Army. According to the law, any commissioned officer who served between December 7, 1941, and December 28, 1945, and who was not separated from service under other than honorable conditions is eligible for appointment into the Regular Army.

Appointments will be made in the grades of second lieutenant, first lieutenant, captain or major. The grade and rank of an appointee will be determined in accordance with the amount of constructive service or actual commissioned service, whichever is greater, with which he is credited.

Credit will be given toward constructive service for the number of years that the applicant's age exceeds 25 on the date of appointment. Credit will be given toward actual commissioned service for the period of time that the applicant was on active federal service as a commissioned officer between December 7, 1941, and the date of appointment.

Grades provided for Medical Department officers selected for appointment are as follows:

First lieutenant: Less than three years of actual commissioned service, or 25 to 27 years of age, inclusive.

Captain: Three or more but less than twelve years of actual commissioned service, or 28 to 36 years of age, inclusive.

Major: Twelve or more but less than twenty years of actual commissioned service, or 37 to 44 years of age, inclusive.

No officer will be appointed in the Dental, Medical, Veterinary or Pharmacy Corps if upon appointment he would receive credit for twenty or more years of service or if he has attained the age of 45.

Current requirements included in Army Regulations governing the appointment of Dental, Medical and Veterinary Corps officers, with the exception of age requirements, will apply to all applicants.

Applications for appointment into the Regular Army must be made in duplicate on WD AGO Form 62, dated November 1, 1945. An applicant on active duty must submit the application through his immediate commander. An applicant not on active duty will submit the application direct to the Adjutant General, War Department, Washington 25, D. C., Attention: AGSO-R; or, if residing outside the continental limits of the United States, to the commander of the theater in which he is residing.

All applications must reach their destination not later than March 1, 1946.

LIST OF ARMY DENTAL OFFICERS SEPARATED FROM SERVICE

The following Army dental officers have been separated from service, according to lists received from the Dental Division, Office of the Surgeon General, U. S. Army. These lists are not complete. Publication will be given to other names as soon as possible.

Alabama

Birmingham	Hewes, John F., III	Capt.
Dothan	Huskey, Dow T.	Capt.
Ft. Payne	Everett, Horace M.	Maj.
Gadsden	Herndon, Charles T.	Maj.
Jackson	Fleming, John E., Jr.	Capt.
Langdale	Marshall, William L.	Capt.
Opelika	Guifbeau, Hugh F.	Capt.

Arizona

Safford	Hiesser, Frank G.	Maj.

Arkansas

Arkadelphia	Golden, Roy F.	Capt.
Augusta	Dodd, Perry L.	Lieut.
Cotton Plant	Gephart, Bryce B.	Capt.
Helena	Schrantz, Myron A.	Maj.
Junction City	Jones, William T.	Capt.
Little Rock	Alstadt, William R.	Capt.
Magnolia	Bird, Roy M.	Lieut.

Australia

Victoria	Greenwald, Nathaniel	Capt.

California

Altadena	Whitney, Robert L.	Lieut.
Bakersfield	Davis, Lewis L.	Capt.
Escondido	Babcock, James A.	Capt.
Fresno	Curley, Martin J.	Capt.
Glendale	Barber, Donald W.	Capt.
Hollywood	Bowers, Dwight F.	Capt.
Los Angeles	Davis, Raymond H.	Capt.
Los Angeles	Higue, George J.	Capt.
Los Angeles	Hoke, Warren J.	Lieut.
Los Angeles	Jacobson, Joseph	Capt.
Los Angeles	Marken, Michael L.	Lieut.
Los Angeles	Munn, Richard R.	Capt.
Los Angeles	Spiro, Ralph F.	Capt.
Los Angeles	Urbanowski, V. L.	Capt.
Lynwood	Dryden, Morton F.	Capt.
Napa	Brown, Leland R.	Capt.
Nevada City	Bell, John R.	Capt.
Oakland	Wilson, Kermit A.	Capt.
Pasadena	Gossard, Guy C.	Maj.
Rio Vista	Green, Tom M.	Lt. Col.
Sacramento	Harbinson, Josiah W.	Capt.
Sacramento	Kauffman, Sanford N.	Maj.
Sacramento	Kettell, Harold H.	Capt.
San Francisco	Busterna, Frank	Capt.
San Francisco	Chappell, Elmer C.	Lt. Col.
San Francisco	Ferber, Erwin W.	Col.
San Francisco	Hayes, Joseph A.	Capt.
San Francisco	Knutson, Robert N.	Maj.
San Francisco	Margoliash, Jacob S.	Lieut.
San Francisco	Moore, Herbert T., Jr.	Capt.
San Francisco	Rudee, Lynn M.	Capt.
San Francisco	White, Ivan J.	Capt.
San Francisco	Wofford, Clarence D.	Capt.
San Leandro	Hutson, Clifford L.	Capt.
San Luis Obispo	Campbell, Lorrin W.	Lieut.
San Mateo	Cafferata, August J.	Capt.
San Rafael	Dobbins, Leo G.	Capt.
Santa Barbara	Jack, Richard F.	Capt.
Santa Monica	Katzky, Albert L.	Capt.
Sausalito	Rossman, Frank E.	Maj.
Tulelake	Rieben, Donald G.	Capt.
Ukiah	Curtner, Raymond M.	Capt.
Visalia	Adelsbach, Albert S.	Capt.
Willowbrook	Hyatt, Ivan D.	Capt.

Colorado

Canon City	Pauls, Charles E.	Capt.
Delta	Cox, Marvin A.	Maj.
Denver	Dubin, Louis I.	Lieut.
Denver	Earley, William L.	Maj.
Denver	Graham, Robert D.	Capt.
Denver	Weaver, Raymond W.	Capt.
Glenwood Springs	Griffith, Elden R.	Maj.
	Strong, James M.	Capt.
Grand Junction	Carpenter, Clifford E.	Capt.
Lamar	Morris, Kenneth I.	Capt.
Manitou Springs	Varley, Edwin W., Jr.	Maj.
Pueblo	Chafee, Glenn R.	Lt. Col.
Victor		

Connecticut

Bridgeport	Shelnitz, Hyman L.	Capt.
Greenwich	Ward, William T., Jr.	Capt.
Hamden	Cassity, Jack P.	Capt.
Hartford	Caracciolo, P. R.	Capt.
Hartford	Reiner, Leon P.	Capt.
Hartford	Weiner, Irving S.	Capt.
Middletown	Garofalo, Sebastian	Capt.
New Haven	Berdon, Louis J.	Capt.
New London	Impellitteri, S. J.	Lieut.
Norfolk	Eggleton, Leo J.	Capt.
Portland	Grower, Israel	Capt.
Stratford	Jepson, Chauncey	Capt.
Winsted	Falzone, Charles A.	Capt.

Delaware

Claymont	Schiek, Allen G.	Capt.
Farnhurst	Lauro, Mario A.	Capt.
Wilmington	Mason, William H.	Capt.
Wilmington	Tomases, Ralph	Capt.
Wilmington	Wintrup, Joseph P.	Maj.

District of Columbia

Chevy Chase	Wheeler, Harry M.	Lt. Col.
Washington	Caden, Jesse	Capt.
Washington	Demar, Philip J.	Capt.
Washington	Matthews, Jerome E.	Lieut.

	Florida	
Clearwater	Van Brunt, W. O.	Lt. Col.
Jacksonville	Scollard, Paul T.	Maj.
Kissimmee	Garmany, William N.	Maj.
Miami	Ellison, Clyde J.	Maj.
Orlando	Wilson, George F.	Maj.
St. Cloud	Chamberlin, W. G.	Capt.
Sebring	Martin, Herman W.	Maj.
Tampa	Traviesa, Anthony A.	Capt.
Wauchula	McLendon, G. V., Jr.	Capt.
	Georgia	
Athens	Elder, Charles F., Jr.	Maj.
Atlanta	Barr, Carl E.	Capt.
Atlanta	Crosswell, Harry A.	Capt.
Atlanta	Douglas, Charles L.	Lt. Col.
Atlanta	Goldstein, Marvin C.	Capt.
Atlanta	Hodnett, Walter C., Jr.	Maj.
Atlanta	Sturedevant, C. M.	Capt.
Atlanta	Zion, Sam D.	Capt.
Carrollton	Brock, William C.	Capt.
Conyers	Cornwell, Joseph D.	Capt.
Eatonton	Stribling, J. Nick	Lt. Col.
Gainesville	Scott, John G.	Capt.
Marietta	Musarra, Francis O.	Maj.
Milledgeville	Zattau, Charles M.	Capt.
Rome	McNeil, Perry M.	Capt.
Savannah	Hohenstein, C. L.	Lt. Col.
Savannah	Sewell, Gaines E., Jr.	Capt.
Winder	Price, David A.	Capt.
	Idaho	
Boise	Kahn, Garson L.	Capt.
	Illinois	
Belleville	Hoehner, William T.	Maj.
Berwyn	Firnsin, Charles	Capt.
Berwyn	Krupka, Stanley R.	Capt.
Bunker Hill	Behrens, Carl W.	Capt.
Chicago	Anderson, John A.	Capt.
Chicago	Andreen, Carl O.	Capt.
Chicago	Burtzoff, Albert L.	Capt.
Chicago	Casey, Gerard J.	Capt.
Chicago	Doner, Allen G.	Capt.
Chicago	Grebliunas, Vincent J.	Capt.
Chicago	Gregoline, Monty R.	Capt.
Chicago	Hecht, Irving	Capt.
Chicago	Imber, Elmer M.	Lieut.
Chicago	Jun, Joseph W.	Capt.
Chicago	Kaiser, William J.	Capt.
Chicago	Kane, William F.	Lieut.
Chicago	Kincaid, Clement J.	Capt.
Chicago	Kowalski, C. W., Jr.	
Chicago	Larond, Raymond J.	Capt.
Chicago	Lewis, Maxwell	Capt.
Chicago	Lewison, Bernard	Capt.
Chicago	McDonald, Lyle F.	Capt.
Chicago	Mayer, George F.	Capt.
Chicago	Melcarek, T. A.	Capt.
Chicago	Meyer, George E.	Col.
Chicago	Minch, Arthur	Capt.
Chicago	Mondo, Joseph G.	Maj.
Chicago	Norton, Joseph A.	Capt.
Chicago	Olson, Allan M.	Capt.
Chicago	Pearson, Glen O.	Maj.
Chicago	Pogirski, Henry H.	Capt.
Chicago	Pomernacki, C. L.	Capt.
Chicago	Shallman, Morton	Capt.
Chicago	Siegel, Theodore	Capt.
Chicago	Skwiot, Phil A.	Capt.
Chicago	Smith, Solomon I.	Capt.
Chicago	Stern, Leon M.	Lt. Col.
Chicago	Stockton, Roger K.	Capt.
Chicago	Townsend, G. W.	Lt. Col.
Chicago	Williams, Ned B.	Lieut.
Chicago	Zuber, Harry G.	Maj.
Cicero	Cesal, Fred J.	Capt.
Clifton	Allen, William E.	Capt.
Collinsville	Kaiser, Elmer G.	Capt.
Elmhurst	Richardson, G. H.	Lt. Col.
Fairfield	Hallam, Lloyd J.	Capt.
Hanover	Ferguson, Theodore R.	Maj.
Highland Park	Englert, George L.	Maj.
Hillsboro	Hammond, Harold T.	Capt.
Newton	Riley, Medfred S.	Maj.
Nokomis	Perkins, Roscoe V.	Capt.
Oak Park	Betty, James	Maj.
Pittsfield	Flatt, Francis L.	Maj.
Plainfield	Embleton, Charles G.	Lieut.
Rockford	Karceski, Harry A.	Capt.
St. Louis	Prindable, Thomas K.	Capt.
Staunton	McBrien, James A.	Lt. Col.
Sycamore	Newman, Russell E.	Capt.
	Indiana	
Batesville	Timmerman, R. E.	Capt.
Bloomington	McDaniel, G. W.	Lt. Col.
Columbia City	Grant, Walter H.	Capt.
Crown Point	Troutwine, Gale H.	Lieut.
Edwardsport	Scudder, John F.	Capt.
Evansville	Lieberman, H. G.	Capt.
Evansville	Wilbanks, John H.	Capt.
Ft. Wayne	Bosselman, Elmer B.	Capt.
Ft. Wayne	Mills, Robert R.	Capt.
Gary	Daubenheyer, S. B.	Capt.
Georgetown	Greer, Nuby P.	Maj.
Huntington	Shonkwiler, Virgil G.	Capt.
Indianapolis	Eichman, Philip J.	Capt.
Indianapolis	Fogle, Philip	Maj.
Indianapolis	Patterson, Samuel	Capt.
Jeffersonville	Prentice, Wilson E.	Capt.
Kokomo	Maxwell, William F.	Maj.
Marion	Roush, Charles E.	Maj.
Milford	Hurd, Eldon R.	Capt.
Mount Pleasant	Traut, Henry T.	Capt.
Mount Vernon	Eckerty, Torrence L.	Capt.
New Castle	Cofield, Kenneth R.	Lt. Col.
Noblesville	Shanks, Manson S.	Capt.
Odon	Baker, James E.	Capt.
Terre Haute	Drew, Merle C.	Capt.
Tipton	Collins, Robert J.	Capt.
Westport	Sparks, Kenneth A.	Capt.
Worthington	Dyer, Wilson C.	Capt.
	Iowa	
Ackley	Witt, Elroy H.	Maj.
Alta	Cunningham, H. P.	Capt.
Anamosa	Frank, Francis C.	Capt.
Avoca	Reinert, Gervase T.	Maj.
Cedar Rapids	Naibert, Richard L.	Maj.
Charles City	Hitzhusen, John F.	Capt.
Clinton	Biedinger, Charles L.	Capt.
Corydon	Spicer, George H.	Maj.
Council Bluffs	Arch, Eldred L.	Capt.
Denison	Servoss, Merle L.	Capt.
Des Moines	Morrow, Burce J.	Lt. Col.

Ft. Dodge	Larson, Leroy N.	Capt.
Ft. Dodge	Smith, Leon F.	Capt.
Hamburg	Markwell, Francis M.	Capt.
Iowa City	Brauer, John C.	Lt. Col.
Iowa City	Craig, Adrian W.	Lieut.
Iowa City	Maris, Arthur M.	Maj.
Mallard	Kral, Joseph W.	Capt.
Manchester	Feld, Edward L.	Capt.
Oxford Junction	Irish, Willard E.	Capt.
Sioux City	Konegni, Stanley J.	Capt.
Spirit Lake	Maytum, Francis V.	Lieut.
Storm Lake	Raymond, Thomas C.	Capt.
Swea City	Anderson, Clarence C.	Maj.
Tipton	Slavin, Charles N.	Maj.
Wellsburg	Eicher, LaVerne B.	Maj.

Kansas

Atwood	Cochran, Kenneth I.	Capt.
Caldwell	Turner, Reuben L.	Capt.
Emporia	Turney, Forrest N.	Capt.
Hutchinson	Rogers, Leo A.	Capt.
Kansas City	Kubitscheck, Leo J.	Capt.
Kansas City	Lee, William B.	Lt. Col.
Kingman	Burket, Joseph F.	Capt.
Lindsborg	Larson, Berthold O.	Capt.
Newton	Burner, John D.	Capt.
Nickerson	Hawk, Chesley N.	Maj.
Salina	Grammer, George W.	Maj.
Valley Falls	Marks, Melchior W.	Maj.
Wichita	Blais, Otto R.	Capt.
Wichita	Galvin, Malcom E.	Capt.
Wichita	Kolosic, Charles W.	Maj.
Wichita	Park, Frank W.	Capt.

Kentucky

Berea	Marshall, Eugene H.	Capt.
Dawson Springs	Howton, Floyd D.	Maj.
Franklin	Neely, Bassett W.	Capt.
Lexington	Welch, Edward L.	Capt.
Louisville	Carr, Franklyn J.	Capt.
Louisville	Miller, Robert J.	Maj.
Middlesboro	Armstrong, Paul J.	Capt.
Owensboro	Morrison, William D.	Lieut.
Pleasureville	Detwiler, Daniel K.	Capt.

Louisiana

Bogalusa	Fontana, Samuel J.	Maj.
Bunkie	Johnson, Joseph E.	Maj.
Hammond	Magee, Doyle C.	Capt.
Haynesville	Hoopes, Burdette E.	Capt.
Jonesboro	Stinson, Jamie T.	Maj.
New Orleans	Benit, Emmett J.	Capt.
New Orleans	Flinn, James A., Jr.	Capt.
New Orleans	Healey, Charles S.	Capt.
New Orleans	Orlando, Anthony V.	Capt.
New Orleans	Robichaux, Arthur L.	Capt.
Rayne	Allen, Wilson G.	Maj.
Shreveport	Colquitt, Walter T.	Maj.
Shreveport	Waits, Simeon J.	Maj.
Sulphur	LaBarbera, Frank A.	Capt.

Maine

Auburn	Mann, Parker	Maj.
Portland	Orr, Dana R.	Capt.
Portland	Smith, Franklin R.	Capt.

Maryland

Baltimore	Beetham, William A.	Capt.
Baltimore	Byrd, Eugene D.	Capt.
Baltimore	Deutsch, Abraham W.	Capt.
Baltimore	DiGristine, Charles L.	Capt.
Baltimore	Dorsey, Brice M.	Lt. Col.
Baltimore	McClees, Joseph G.	Capt.
Baltimore	Poster, Benjamin L.	Capt.
Baltimore	Sober, Louis	Capt.
Boonsboro	Beard, Alfred B.	Lt. Col.
Cumberland	Ryan, William H.	Capt.
Forest Glen	Frederick, John H.	Lt. Col.
Jarrettsville	McDaniel, E. P., Jr.	Capt.

Massachusetts

Belmont	Farrell, Philip J.	Capt.
Belmont	Nesson, John H.	Maj.
Boston	Perman, Maxwell L.	Maj.
Boston	Ray, John G., Jr.	Maj
Brighton	Davin, Thomas F.	Capt.
Brighton	Lubin, Bertram	Capt.
Cambridge	Brown, Roy R.	Capt.
Chelsea	Holland, D. J., Jr.	Maj.
Clinton	Despotopules, N. H.	Capt.
Cohasset	Matteson, W. G., Jr.	Capt.
Dorchester	Turesky, Samuel S.	Capt.
Greenfield	Ostrowski, Edward J.	Lieut.
Hyannis	Kepnes, Benjamin	Capt.
Jamaica Plain	Fallen, Albert C.	Capt.
Lawrence	Grossman, Maurice F.	Maj.
North Grafton	Naiman, Edward I.	Capt.
Roxbury	Slakman, Herman R.	Capt.
Roxbury	Tanner, Harvey A.	Capt.
South Weymouth	Brackett, Philip S.	Maj.
Springfield	Mitchell, Charles	Capt.
Taunton	Adams, William J.	Capt.
Ware	Burgiel, George J.	Capt.
Watertown	Lawton, Benjamin F.	Maj.
West Roxbury	McCann, Charles F.	Maj.

Michigan

Bloomfield Hills	Howell, James H.	Lt. Col.
Detroit	Belensky, Kenneth K.	Lieut.
Detroit	Bien, Edward R.	Capt.
Detroit	Burba, Joseph W.	Lt. Col.
Detroit	Glaesner, Robert D.	Capt.
Detroit	Glynn, Martin A.	Capt.
Detroit	Johnson, Harrison C.	Lieut.
Detroit	Rismann, Raymond	Capt.
Detroit	Sherman, Phillip M.	Capt.
Detroit	Sklar, Jack	Capt.
Detroit	Small, Robert C.	Capt.
Detroit	Sperling, Herman M.	Lieut.
Detroit	Topcik, Harry A.	Maj.
East Lansing	Ricker, Otto L.	Maj.
Flint	Jackel, Isidore L.	Capt.
Grand Rapids	Hoffman, Robert P.	Capt.
Grosse Point	Sloan, Philip W.	Lieut.
Hancock	Curdy, Charles T.	Maj.
Jackson	Sherman, Fred H.	Capt.
Kalamazoo	Howson, Thomas W.	Capt.
Marquette	Beldo, Leo O.	Capt.
Saginaw	Beach, Donald F.	Capt.
Saugatuck	Cramer, Walter H.	Capt.
Sault Ste. Marie	Pollet, Irving L.	Maj.
Worcester	Pearce, James R.	Capt.

Minnesota

Alexandria	Nelson, Neal K.	Capt.
Battle Lake	Howland, John A.	Capt.

Duluth	Northfield, Ivan H.	Lt. Col.
East Grand Forks	Connelly, Ireton G.	Maj.
Faribault	Luhring, Elwin E.	Capt.
Hibbing	Schultz, Cletus S.	Capt.
Huldingford	Schueller, Melvin J.	Capt.
Hutchinson	Sahr, Willard L.	Capt.
Minneapolis	Blumberg, Leonard A.	Capt.
Minneapolis	Harris, Harold L.	Lt. Col.
Minneapolis	Holmes, Stanley P.	Lieut.
Minneapolis	Jacobs, William E.	Capt.
Minneapolis	Pettit, Paul S.	Capt.
Minneapolis	Swanson, Harold C. L.	Capt.
Parkers Prairie	Farringer, Sidney B.	Capt.
St. Paul	Gerber, Eugene L.	Capt.
St. Paul	Rose, Milton	Capt.
St. Paul	Smith, Howard R.	Capt.
Spring Valley	Oleson, Herman R.	Capt.
Watkins	Arendt, Robert J.	Capt.
Wilmar	Lien, John H.	Capt.

Mississippi

Belzoni	Carroll, Lloyd C.	Capt.
Jackson	Burnham, C. M., Jr.	Capt.
Jackson	Chadwick, K. V.	Lt. Col.
Jackson	Russell, Gordon D.	Capt.
Ripley	Dixon, William V.	Capt.
West Point	Abbott, John R.	Capt.

Missouri

Columbia	Marlow, Sidney G.	Capt.
Farmington	Newman, Paul D.	Capt.
Glendale	Gurley, Webb B.	Col.
Hannibal	Ragan, James H.	Capt.
Hayti	Bishop, Harrel	Maj.
Kansas City	Jacobson, Maurice J.	Capt.
Kansas City	Kelley, John C.	Capt.
Kansas City	Martin, Robert O.	Maj.
Kansas City	Owens, Claude D.	Lieut.
Kansas City	Rosser, Thomas J.	Capt.
Kansas City	Teabeau, Ralph B.	Maj.
Kirksville	Bohon, Norton I.	Capt.
Lemary	Harrel, Jerome W.	Capt.
Louisiana	Worthington, J. S.	Lieut.
Normandy	Allenberg, Frank A.	Capt.
Perryville	Urban, Dewey E.	Capt.
Richmond Hts.	Jonas, John F.	Capt.
St. Louis	Bachhuber, Walter R.	Lieut.
St. Louis	Baker, Paul F.	Capt.
St. Louis	Franck, Harry B.	Capt.
St. Louis	Hennessy, Robert E.	Maj.
St. Louis	Huerfahrd, V. H.	Capt.
St. Louis	Rotter, Louis F.	Capt.
St. Louis	Schiestl, John	Capt.
St. Louis	Schwaneck, John T.	Capt.
St. Louis	Wiegers, Ralph C.	Capt.
St. Louis	Wolken, Donald J.	Capt.
University City	Marre, Leo F.	Maj.
University City	Purcell, John J.	Capt.
Webster Groves	Broadhurst, G. B.	Lt. Col.

Montana

Anaconda	Devich, Michael L.	Capt.
Butte	Alderman, Samuel I.	Capt.
Dillon	Stephan, Robert J.	Capt.
Ft. Benton	Nottingham, D. A.	Lieut.
Helena	Smith, Andrew J.	Capt.

Nebraska

Ansley	McCallister, Curtiss S.	Capt.
Ashland	Starns, Harland F.	Capt.
Bloomfield	Cahoy, Andy L.	Capt.
Broken Bow	Housel, Robert W.	Capt.
Falls City	Hoban, Robert P.	Lieut.
Fremont	Walla, William M.	Capt.
Hartington	Lammers, Paul H.	Capt.
Howell	Sixta, Alfred F.	Capt.
Lincoln	Quay, Quentin Q.	Maj.
Lodgepole	Schoenberg, Arthur R.	Maj.
Norfolk	Schreiner, Ora C.	Lt. Col.
Omaha	Circo, Anthony M.	Capt.
Omaha	Conlan, Paul M.	Capt.
Omaha	Huges, Leo J.	Maj.
Omaha	Malek, Howard C.	Maj.
Omaha	Platt, David C.	Capt.
Omaha	Stern, Samuel Z.	Lt. Col.
Seward	Drown, Kenneth E.	Capt.
Tecumseh	Harm, Wayne D.	Maj.
Weeping Water	Petersen, Alfred C.	Maj.

Nevada

Reno	Whitehead, Edwin R.	Capt.

New Hampshire

Berlin	Toussaint, Albert R.	Capt.
Concord	Brown, James B.	Capt.
Dover	Wiseman, Israel	Capt.
East Jeffrey	Cournoyer, F. T.	Maj.
Manchester	Dufort, Gerald E.	Lt. Col.
Manchester	Fraser, William W.	Lieut.
Portsmouth	Dinnerman, Maurice	Maj.

New Jersey

Atlantic City	Fox, Isadore E.	Capt.
Atlantic City	Gardner, Samuel	Maj.
Atlantic City	Levenson, Harold	Capt.
Atlantic City	Slutzky, Fred I.	Capt.
Barnegat	Aumock, George H.	Capt.
Bayonne	Van Natta, Clinton B.	Maj.
Belleville	Parrillo, Anthony C.	Capt.
Belmar	Gassin, Edgar R., Jr.	Capt.
Bloomfield	Freed, George	Capt.
Bloomfield	Stansfield, John B.	Capt.
Bradley Beach	DeVito, Anthony F.	Capt.
Burlington	Zwick, William W.	Capt.
Camden	Weaver, Ellison B.	Maj.
Clifton	Boyarsky, William	Capt.
Clifton	Simon, Morris D.	Capt.
Elizabeth	Yuckman, Nathaniel A.	Maj.
Essex Fells	Stillwell, Edw. C., Jr.	Lieut.
Freehold	Saker, Fred G.	Capt.
Hackensack	Nielsen, Bernhard M.	Maj.
Jersey City	Ainsworth, Clifford F.	Capt.
Jersey City	Forer, Harold H.	Capt.
Jersey City	Forman, Sidney	Capt.
Jersey City	Leske, Thaddeus G.	Capt.
Jersey City	Taylot, Harry E.	Lt. Col.
Jersey City	Wolfson, Edward	Capt.
Lyons	Zercher, Joseph E.	Maj.
Manasquan	Paperth, Milton P.	Maj.
Maplewood	Hien, Clarence R.	Maj.
Maplewood	Schiller, LeRoy E.	Capt.
Margate	Previti, Angelo	Lieut.
Merchantville	Wyckoff, John I.	Lt. Col.
Montclair	Herrick, Leonard	Capt.
Newark	Adlerstein, Nathan	Maj.

Newark	Collito, Michael B.	Capt.	Bronx
Newark	Feldman, Milton	Capt.	Bronx
Newark	Green, Samuel W.	Capt.	Bronx
Newark	Hilson, Emanuel M.	Capt.	Bronx
Newark	Honig, Milton N.	Capt.	Bronx
Newark	Lakind, David H.	Capt.	Bronx
Newark	Lasky, Meyer	Capt.	Bronx
Newark	Rasnick, Nathan N.	Capt.	Bronx
Newark	Server, Arthur B.	Capt.	Bronx
Newark	Tarant, Leonard J.	Capt.	Bronx
Oaklyn	Butler, Samuel S., Jr.	Capt.	Bronx
Orange	Christiano, Frank J.	Capt.	Bronxville
Orange	Friedman, Leonard	Capt.	Brooklyn
Orange	Levy, Harry	Capt.	Brooklyn
Orange	Price, Wendell L.	Capt.	Brooklyn
Orange	Schmidt, F. E.	Lt. Col.	Brooklyn
Orange	Tymeson, Walter R.	Capt.	Brooklyn
Passaic	Coffey, John J.	Capt.	Brooklyn
Passaic	Ellison, Philip	Capt.	Brooklyn
Passaic	Hirschhorn, Sidney H.	Capt.	Brooklyn
Passaic	Lentz, Harold A.	Lieut.	Brooklyn
Passaic	Storch, Murray	Capt.	Brooklyn
Perth Amboy	Guth, Aaron H.	Capt.	Brooklyn
Perth Amboy	Koch, Kyman D.	Capt.	Brooklyn
Perth Amboy	Pavlovsky, Francis	Lieut.	Brooklyn
Perth Amboy	Symanski, Theodore V.	Maj.	Brooklyn
Plainfield	Fioravanti, Angelo A.	Capt.	Brooklyn
Plainfield	Rosenthal, Lester A.	Capt.	Brooklyn
Rutherford	Winters, Stanley J.	Lieut.	Brooklyn
Somerville	Rabin, Benjamin M.	Capt.	Brooklyn
Sussex	Haggerty, Jack S.	Capt.	Brooklyn
Trenton	Hipple, James W.	Maj.	Brooklyn
Trenton	Levin, Leon	Capt.	Brooklyn
Trenton	Murphy, John J.	Maj.	Brooklyn
Trenton	Silverstein, Max B.	Capt.	Brooklyn
Trenton	Wacks, Seymour M.	Capt.	Brooklyn
Union City	Goldstein, Howard B.	Capt.	Brooklyn
Union City	Jerome, Bernard	Capt.	Brooklyn
Verona	Dakin, John I.	Maj.	Brooklyn
Weehawken	Feinberg, Bernard S.	Capt.	Brooklyn
Wyckoff	Leichtman, Irving A.	Capt.	Brooklyn
	New Mexico		Brooklyn
Albuquerque	McRae, Bruce A.	Lieut.	Brooklyn
Albuquerque	Nye, Kyle	Capt.	Brooklyn
Lovington	Connor, Thomas E.	Capt.	Brooklyn
Roswell	Eiffert, Kenneth P.	Capt.	Brooklyn
Roswell	Johnson, Henry D., Jr.	Capt.	Brooklyn
	New York		Brooklyn
Albany	Ostrowski, John J.	Capt.	Brooklyn
Albany	Sandler, Milton M.	Maj.	Brooklyn
Albany	Smith, William B., Jr.	Maj.	Brooklyn
Albion	Orlando, Thomas N.	Capt.	Brooklyn
Astoria	March, Herbert	Capt.	Brooklyn
Auburn	DePalma, Michael A.	Capt.	Brooklyn
Batavia	O'Neil, John W.	Capt.	Brooklyn
Binghamton	Orcutt, Robert D.	Capt.	Brooklyn
Brentwood	Stern, Bernard	Capt.	Brooklyn
Bronx	Cohen, Leonard	Capt.	Brooklyn
Bronx	Feldman, Herbert G.	Capt.	Brooklyn
Bronx	Goldberg, Charles	Capt.	Brooklyn
Bronx	Golden, Lester M.	Capt.	Brooklyn
Bronx	Greenbaum, Morris	Capt.	Brooklyn
Bronx	Gutfreund, James	Capt.	Brooklyn
Bronx	Kahn, Sidney	Capt.	Brooklyn
Bronx	Poste, Albert G.	Capt.	Brooklyn
Bronx	Rosofsky, Herman L.	Capt.	Brooklyn
Bronx	Salzmann, Francis X.	Capt.	
Bronx	Simms, William	Capt.	
Bronx	Siniscalchi, A. E.	Capt.	
Bronx	Smalline, Samuel G.	Capt.	
Bronx	Spillinger, Ernest	Capt.	
Bronx	Suslow, Harry A.	Capt.	
Bronx	Weinrib, Leonard	Capt.	
Bronx	Weinstein, Jacob	Capt.	
Bronx	Witkin, George J.	Capt.	
Bronx	Wolin, Samuel H.	Capt.	
Bronx	Yurberg, Abraham N.	Capt.	
Bronxville	Stark, Adolph B., Jr.	Capt.	
Brooklyn	Accetta, Anthony F.	Capt.	
Brooklyn	Altman, Irving H.	Capt.	
Brooklyn	Berman, William	Lieut.	
Brooklyn	Blaustein, Samuel	Capt.	
Brooklyn	Blumenfeld, Martin	Capt.	
Brooklyn	Brooks, William M.	Capt.	
Brooklyn	Brown, Abraham	Lieut.	
Brooklyn	Budowsky, Jack	Capt.	
Brooklyn	Caplin, Oscar H.	Capt.	
Brooklyn	Carron, Ralph	Capt.	
Brooklyn	Ceravolo, Joseph J.	Capt.	
Brooklyn	Cohen, Bernard	Capt.	
Brooklyn	Cohen, William	Capt.	
Brooklyn	Dawson, Jerome D.	Capt.	
Brooklyn	Demas, Nicholas C.	Capt.	
Brooklyn	Deutsch, Bernard B.	Capt.	
Brooklyn	Donshik, Alexander	Capt	
Brooklyn	Dunn, Carl	Capt	
Brooklyn	Evans, Harry	Capt.	
Brooklyn	Feinerman, Hyman	Capt.	
Brooklyn	Feld, George J.	Capt.	
Brooklyn	Ferraioli, Joseph	Capt.	
Brooklyn	Fishman, Samuel	Capt.	
Brooklyn	Franklin, Murray M.	Capt.	
Brooklyn	Furman, Abraham	Capt.	
Brooklyn	Garfield, Burton S.	Lieut.	
Brooklyn	Gayner, Irving C.	Capt.	
Brooklyn	Gober, Walter D.	Maj.	
Brooklyn	Goodman, Joseph	Capt.	
Brooklyn	Goodman, Sidney W.	Capt.	
Brooklyn	Gordon, Irving S.	Maj.	
Brooklyn	Graziano, John	Capt.	
Brooklyn	Haag, Samuel M.	Capt.	
Brooklyn	Haber, Abraham	Capt.	
Brooklyn	Harling, Clyde H.	Maj.	
Brooklyn	Hebald, Ralph	Capt.	
Brooklyn	Heffron, Samuel	Capt.	
Brooklyn	Hersch, Irving	Capt.	
Brooklyn	Himoff, Ick T.	Capt.	
Brooklyn	Hinds, Leslie R.	Capt.	
Brooklyn	Hoffman, Jack	Capt.	
Brooklyn	Hornick, Harry	Capt.	
Brooklyn	Horowitz, A. H.	Maj.	
Brooklyn	Janiger, Nathaniel	Capt.	
Brooklyn	Kaplan, Irving H.	Capt.	
Brooklyn	Karasov, Lloyd G.	Capt.	
Brooklyn	Karlin, Samuel A.	Capt.	
Brooklyn	Kramer, William B.	Lieut.	
Brooklyn	Kreshtool, Louis	Capt.	
Brooklyn	Lambiente, Jerry A.	Lieut.	
Brooklyn	Larocca, Thomas J.	Maj.	
Brooklyn	Lessner, Sam M.	Capt.	
Brooklyn	Levin, Arthur	Capt.	
Brooklyn	Lieberman, N. W.	Capt.	
Brooklyn	Lippe, Nathan	Capt.	
Brooklyn	Lucus, Leo	Capt.	

Brooklyn	McGuinn, James T.	Maj.	Far Rockaway	Radwin, Maurice	Capt.
Brooklyn	Mackta, Leo	Maj.	Flushing	Junemann, William F.	Lieut.
Brooklyn	Marino, Antonio J.	Capt.	Flushing	White, Joseph A.	Maj.
Brooklyn	Melrose, William	Capt.	Geneva	Brennan, Thomas H.	Capt.
Brooklyn	Mencher, Abraham	Capt.	Glen Cove	Coleman, Moses	Capt.
Brooklyn	Metric, Irving I.	Capt.	Glen Cove	Kerber, Hans	Capt.
Brooklyn	Michaels, David D.	Capt.	Glens Falls	Collins, Howard H.	Capt.
Brooklyn	Miller, Samuel	Capt.	Glens Falls	Garrett, Richard D.	Capt.
Brooklyn	Nardi, Samuel G.	Capt.	Gowanda	Glazier, George B.	Capt.
Brooklyn	Ockun, Irving	Capt.	Ithaca	Baldini, Ralph P.	Capt.
Brooklyn	Padow, Harold	Capt.	Jackson Heights	Fass, Nathan J.	Capt.
Brooklyn	Pakarow, William	Capt.	Jackson Heights	Siegel, Benjamin F.	Capt.
Brooklyn	Penna, Charles J.	Capt.	Jackson Heights	Shapiro, Meyer	Capt.
Brooklyn	Pollack, Irving S.	Capt.	Jamaica	Bauch, Seymour	Capt.
Brooklyn	Posner, Benjamin S.	Lieut.	Jamaica	Boston, Harry L., Jr.	Capt.
Brooklyn	Price, Milton I.	Capt.	Jamaica	Luenfeld, Leonard J.	Capt.
Brooklyn	Price, Saul	Capt.	Kew Gardens	Goldsmith, Rubin	Lieut.
Brooklyn	Ratner, Aaron	Capt.	Larchmont	Teriman, Stanley S.	Capt.
Brooklyn	Reyer, Edward A.	Capt.	Lockport	Ferington, Anthony E.	Capt.
Brooklyn	Reyer, Gabriel	Lieut.	Long Island	Benerofe, Alvin	Lieut.
Brooklyn	Rosenberg, Jerome	Capt.	Long Island	Berger, Morris	Lieut.
Brooklyn	Ross, Irving R.	Capt.	Long Island	Crawford, James O.	Capt.
Brooklyn	Roth, Monroe S.	Capt.	Long Island	Dixon, Frank E.	Maj.
Brooklyn	Rubin, Leon	Maj.	Long Island	Goldstein, Isadore	Capt.
Brooklyn	Saget, Samuel	Capt.	Long Island	Grauer, William S.	Capt.
Brooklyn	Santomauro, T. J.	Maj.	Long Island	Guerra, Michael L.	Capt.
Brooklyn	Schreiber, Arthur	Maj.	Long Island	Gulick, Floyd B.	Capt.
Brooklyn	Schwartz, Arthur E.	Capt.	Long Island	Harrison, Arnold W.	Capt.
Brooklyn	Schwartz, George	Capt.	Long Island	Hersh, Leo	Lieut.
Brooklyn	Schwartz, Milton	Capt.	Long Island	Ironson, Mortimer I.	Capt.
Brooklyn	Silberberg, William A.	Capt.	Long Island	Kameros, Arthur	Capt.
Brooklyn	Silverman, Sidney I.	Capt.	Long Island	Lesch, Raymond C.	Capt.
Brooklyn	Soloway, Robert L.	Capt.	Long Island	Rankow, Robin M.	Maj.
Brooklyn	Soroko, Arthur M.	Capt.	Long Island	Rattner, Nathaniel	Capt.
Brooklyn	Stolper, Enoch L.	Capt.	Long Island	Shapiro, Barney B.	Lieut.
Brooklyn	Strum, Philip E.	Capt.	Long Island	Shulman, Joseph	Capt.
Brooklyn	Swerdloff, George	Capt.	Long Island	Sorkin, Harold R.	Capt.
Brooklyn	Travin, Milton S.	Maj.	Long Island	Urgo, George R.	Capt.
Brooklyn	Vogel, William G.	Capt.	Long Island	Wechsler, Milton E.	Capt.
Brooklyn	Walmus, Adam V.	Capt.	Lynbrook	Greenberg, Louis H.	Capt.
Brooklyn	Ward, Lester B.	Lieut.	Lynbrook	Levy, Joseph R.	Capt.
Brooklyn	Watine, Arthur	Capt.	Malverne	Sternfeld, Alfred J.	Capt.
Brooklyn	Weinstein, Seymour	Capt.	Middletown	Studin, Paul	Capt.
Brooklyn	Weinstock, Herbert	Capt.	Mount Vernon	Kaplan, Jack M.	Maj.
Brooklyn	Weisman, Marcus	Capt.	Mount Vernon	Rebholz, Anthony O.	Capt.
Brooklyn	Winter, Martin	Capt.	Mount Vernon	Streusand, Bernard L.	Capt.
Brooklyn	Yankowitz, Abraham	Capt.	Mount Vernon	Trauner, Sigmund S.	Capt.
Brooklyn	Zimmerman, Edward	Lieut.	New Hartford	Folley, John F., Jr.	Capt.
Brooklyn	Zuckerman, Irving	Lieut.	New York	Adler, Jerome R.	Capt.
Buffalo	Allen, Kermit L.	Lt. Col.	New York	Asen, Emanuel M.	Capt.
Buffalo	Bruckheimer, Irving	Capt.	New York	Barsh, Jacob	Maj.
Buffalo	Foran, John M.	Capt.	New York	Berkowitz, Martin L.	Capt.
Buffalo	Gibbons, Allan V.	Capt.	New York	Bernstein, Arthur H.	Capt.
Buffalo	Giovino, Joseph D.	Capt.	New York	Blume, Saul S.	Capt.
Buffalo	Hayward, Herbert L.	Capt.	New York	Browner, Murray A.	Capt.
Buffalo	Koteras, Raymond L.	Lieut.	New York	Broyde, Solomon	Capt.
Buffalo	Pankow, Charles W.	Maj.	New York	Buchman, Irving	Capt.
Buffalo	Schulman, Joseph	Capt.	New York	Buchsbaum, Sidney L.	Capt.
Buffalo	Sielski, Walter W.	Capt.	New York	Cooper, Samuel	Lieut.
Canisteo	Stewart, Harold O.	Capt.	New York	Davenport, S. E., III	Lieut.
Chazy	Narreau, Orville F.	Capt.	New York	Eckman, Irving I.	Capt.
Cheektowaga	Borowiak, Thad J.	Capt.	New York	Fass, Harry	Capt.
Cornwall-on-Hudson	Dorfman, David L.	Capt.	New York	Feinstein, George	Capt.
Easthampton	Baker, David C.	Lieut.	New York	Fingerhut, Julius J.	Capt.
Ellenville	Karow, Seymour M.	Capt.	New York	Fischer, Gustave B.	Lieut.
Elmhurst	Rudin, Bernard	Capt.	New York	Forster, Alexander S.	Capt.
Elmira	Goldsmith, Milton	Capt.	New York	Franco, Justino Jr.	Capt.
			New York	Friedman, Stanley	Capt.

New York	Frumberg, Milton S.	Capt.	Ogdensburg
New York	Gecker, Leon M.	Capt.	Oneida
New York	Geisner, Abraham	Lieut.	Oneida
New York	Gemson, Sidney	Capt.	Oneonta
New York	Glashow, Samuel	Lieut.	Ozone Park
New York	Glass, Herman	Capt.	Peekskill
New York	Gluck, Richard E.	Capt.	Phoenix
New York	Gold, Henry M.	Capt.	Pine Plains
New York	Goldenburg, Wm. H.	Capt.	Pleasantville
New York	Gralnick, Melvin M.	Capt.	Port Washington
New York	Green, Richard	Capt.	Poughkeepsie
New York	Guastella, Martin A.	Lieut.	Ravena
New York	Heiligman, Harold	Capt.	Rego Park
New York	Hoffman, B. M.	Capt.	Rochester
New York	Hogan, William J.	Maj.	Rochester
New York	Joslin, Robert	Capt.	Rochester
New York	Kanya, John	Capt.	Rochester
New York	Kassal, Samuel Z.	Capt.	Rochester
New York	Keitelman, Norman	Capt.	Rochester
New York	Kudin, Abraham A.	Capt.	Scarsdale
New York	Liebson, Morris L.	Capt.	Sea Cliff
New York	Lipsett, Max M.	Lieut.	Setauket
New York	Love, Clifford R.	Capt.	Stamford
New York	McNally, John E.	Maj.	Staten Island
New York	McNight, Scott S.	Capt.	Staten Island
New York	Mandelbaum, W. J.	Capt.	Staten Island
New York	Maslansky, Manuel	Maj.	Staten Island
New York	Massi, Joseph P.	Capt.	Syracuse
New York	Merker, Harry	Lieut.	Utica
New York	Mever. Samuel	Lieut.	Utica
New York	Mishkin, Edward A.	Capt.	Valhalla
New York	Ornstein, David	Capt.	Washington
New York	Pollack, William	Capt.	Wellsville
New York	Randman, Bernard	Capt.	West Brentwood
New York	Relkins, Joseph	Capt.	Westbury
New York	Rockey, Edward H.	Maj.	Westfield
New York	Rosenberg, Herbert D.	Capt.	Williston
New York	Rosenn, Bernard	Capt.	Williston Park
New York	Rothenberg, Fred	Capt.	Woodhaven
New York	Sardell, Harry	Capt.	Woodside
New York	Savoy, William J.	Maj.	Yonkers
New York	Sawicki, John B.	Capt.	Yonkers
New York	Schiff, William G., Jr.	Capt.	Yonkers
New York	Schneider, Benjamin	Capt.	Yonkers
New York	Schoenfeld, William	Capt.	
New York	Schwartz, Gilbert	Capt.	
New York	Schwartz, Leo R.	Capt.	
New York	Schwartz, Sidney	Capt.	
New York	Seldin, Steward D.	Maj.	
New York	Shultz, Joseph	Capt.	
New York	Siegel, Irwin	Maj.	
New York	Sikes, Ardry L.	Capt.	
New York	Silver, Julius	Capt.	
New York	Smokler, Jack	Capt.	
New York	Spitaleri, Joseph P.	Capt.	
New York	Stanislaw, Saul L.	Capt.	
New York	Swersky, Samuel S.	Capt.	
New York	Traub, Daniel L.	Capt.	
New York	Vogel, Leonard K.	Maj.	
New York	Waldman, Morton A.	Capt.	
New York	Weimann, F. W.	Capt.	
New York	Weintraub, Milton	Capt.	
New York	Wiley, Albert	Maj.	
New York	Zackheim, Lester I.	Capt.	
New York	Zinbarg, Jacob	Lieut.	
New York	Zola, Albert	Capt.	
New Rochelle	Klegman, Albert	Capt.	
Niagara Falls	Kramer, Joseph M.	Capt.	

Murnen, Owen F.	Capt.	
Baglio, Leonard J.	Capt.	
Pawlicki, Erwin J.	Capt.	
Wayman, Leon H.	Maj.	
Greenburg, Wm. J.	Capt.	
Pelaia, Ralph F.	Capt.	
Lassman, Morris L.	Capt.	
Kappel, Max A.	Capt.	
Goldberg, Charles	Capt.	
Guenard, Eugene J.	Maj.	
Arnold, Charles W. H.	Capt.	
Koechley, Robert H.	Maj.	
Pleasure, Max A.	Capt.	
Carroll, Edward T.	Capt.	
DeRoberts, Theo. M.	Capt.	
Greene, Myron E.	Capt.	
Kleinhans, Elmer G.	Capt.	
Koop, Burdette H.	Capt.	
Woloshin, David M.	Capt.	
Miller, Murray B.	Capt.	
Ellen, Samuel S.	Capt.	
Steeves, Edward E.	Capt.	
Brodhead, S. H.	Capt.	
Atlas, Eugene Earl	Capt.	
Cooper, Nathan	Capt.	
Roth, Rudolph	Capt.	
Xiques, Edward F.	Capt.	
Isaacs, Lester A.	Capt.	
Ogden, Myron L.	Capt.	
Panzone, Michael T.	Capt.	
Metz, Karl H.	Col.	
Yellen, Arthur	Capt.	
Spencer, Harvey W.	Capt.	
Hoffman, Wm. H.	Capt.	
Mackler, Harry E.	Capt.	
Johnson, Chas. A. T.	Capt.	
Adams, James D.	Capt.	
Davidson, Louis	Capt.	
Lynch, Howard P.	Capt.	
Vredenburgh, D. M. J.	Lieut.	
Epstein, Murray	Capt.	
Flamer, Mortimer	Capt.	
Mason, Robert I.	Lieut.	
Ressler, Hubert B.	Capt.	

North Carolina

Asheboro	McIntosh, James A.	Capt.
Asheville	Shapiro, Eugene N.	Capt.
Charlotte	Freedland, Jacob B.	Capt.
Conover	Drum, Borden C.	Maj.
Durham	Kirkland, G. F., Jr.	Lieut.
Ellicottville	Northrup, George W.	Capt.
Glenville	Fowler, Thomas G.	Lt. Col.
Greenville	Wright, Dan	Capt.
Hickory	Fritz, Conrad B.	Capt.
Kenly	Etheridge, James E.	Lieut.
Monroe	Menius, John W., Jr.	Capt.
Mt. Olive	Baughan, Herbert A.	Capt.
Salisbury	Zimmerman, J. W., Jr.	Capt.
Tabor City	Potts, Samuel J.	Capt.
Wilmington	Harris, Archie L.	Capt.
Winston-Salem	Logan, William C.	Maj.
Winston-Salem	Tuttle, David M.	Capt.

North Dakota

Dickinson	Gunderson, Arthur E.	Capt.
Grafton	Naegeli, Harold L.	Maj.
Jamestown	Stenseth, Leonard S.	Capt.
Kulm	Fergusson, Cecil O.	Lt. Col.

Ohio

Akron	Kaufer, Andrew	Capt.
Akron	Marcey, Michael S.	Capt.
Athens	Sprague, Edward H.	Maj.
Canton	Briggle, Homer V.	Maj.
Canton	Foltz, Joseph W.	Maj.
Canton	Ginsberg, Hymen L.	Capt.
Canton	Ripich, John W.	Capt.
Cincinnati	Goldman, Bernard	Capt.
Cincinnati	Papesch, Walter C.	Capt.
Cincinnati	Rauch, Gordon L.	Lieut.
Cincinnati	Schneider, Bernard S.	Lieut.
Cincinnati	Vosseler, William F.	Lt. Col.
Cleveland	Albers, Clarence F.	Lt. Col.
Cleveland	DeMarco, Anthony	Capt.
Cleveland	Engelman, Jack S.	Lieut.
Cleveland	Frank, Barnett	Capt.
Cleveland	Frank, Edward E.	Capt.
Cleveland	Hollander, Harold R.	Capt.
Cleveland	Johnson, Albert W.	Capt.
Cleveland	Kasik, Alfred F.	Capt.
Cleveland	Kennedy, Edwin M.	Lt. Col.
Cleveland	McCarthy, Edward F.	Capt.
Cleveland	Mancin, Alexander A.	Capt.
Cleveland	Nisius, John W.	Capt.
Cleveland	Peterman, Sidney L.	Lieut.
Cleveland	Smith, Veryl C.	Capt.
Cleveland	Tomaro, Anthony J.	Capt.
Cleveland Hts.	Lieberman, Irving S.	Lieut.
Cleveland Hts.	Spilka, Conrad	Maj.
Columbus	Finelli, Henry N.	Lt. Col.
Columbus	Gump, Clyde D.	Capt.
Columbus	Harris, Booker W.	Capt.
Columbus	Kammerling, Donald	Maj.
Columbus	Shustick, Cecil	Capt.
Columbus	Stark, Kenneth O.	Capt.
Dayton	Hirsch, Carl P.	Maj.
Dayton	Nelson, Richard V.	Maj.
Findlay	Thompson, Victor L.	Maj.
Fremont	Naftulin, Irving L.	Capt.
Gallipolis	Ingels, Clyde J.	Capt.
Germantown	Storer, Vernon C.	Capt.
Hamilton	Duersch, William A.	Capt.
Hillsboro	Rogers, Roy S., Jr.	Capt.
Ironton	Feucher, Carl E.	Capt.
Lakewood	Christensen, R. W.	Capt.
Lakewood	Jenney, Edward R.	Maj.
Lancaster	Shank, Carlton H.	Capt.
Laurelville	Kelley, Edgar D.	Lt. Col.
Mansfield	Hein. Clarence R.	Maj.
Mansfield	Dutro, John T.	Capt.
Massillon	Hughes, Ernest V.	Lt. Col.
Portsmouth	Stone, William H.	Maj.
Ravenna	Beal, James W. C.	Capt.
Rocky River	Maximuke, Peter W.	Maj.
Sandusky	Close, August F.	Capt.
Springfield	Thomas, L. W.	Lieut.
Springfield	Vogelsberg, Harry F.	Maj.
Steubenville	Fach, Francis C.	Lieut.
Toledo	Taylor, Renwick M.	Capt.
Wadsworth	Keeler, Glenn E.	Capt.
Wauseon	Boucher, Harold E.	Maj.
Youngstown	Maxwell, Joseph L.	Maj.
Youngstown	Roth, David A.	Lieut.

Oklahoma

Ada	Moore, Jack D.	Maj.
Bristow	Mitchell, Rupert C.	Capt.
Chandler	Pennington, Dee C.	Maj.
Clinton	Sebert, Clarence A.	Capt.
Comanche	York, John C.	Lieut.
Durant	Williams, Phillip E.	Lt. Col.
El Reno	Martin, Kemp	Capt.
Enid	Carl, Roy G.	Maj.
Lawton	Cole, Leon L., Jr.	Lt. Col.
Oklahoma City	Ray, Ralph R.	Maj.
Oklahoma City	Rowe, Lloyd F.	Capt.
Sulphur	Shamel, William L.	Capt.
Tulsa	Baker, Robert W.	Maj.
Tulsa	Childs, Casey	Col.
Tulsa	Moore, Lewis R.	Maj.

Oregon

Ashland	Walker, Raymond E.	Capt.
Bandon	Dodds, Floyd W.	Maj.
Harrisburg	Epeneter, Robert A.	Capt.
Klamath Falls	Rees, Denton J.	Maj.
Lakeview	Naslund, Alfred E.	Capt.
McMinnville	Shepherd, William T.	Capt.
Mansfield	Passerni, James	Capt.
Oregon City	Wilson, Roland J.	Capt.
Oswego	Schoonmaker, P. L.	Lt. Col.
Portland	Deonier, William C.	Maj.
Portland	Lutz, Frank V.	Lt. Col.
Portland	McDonald, P. E.	Capt.
Portland	Moschella, Philip J.	Capt.
Portland	Neely, Arnol R.	Capt.
Portland	Swanson, Everett A.	Lt. Col.
Portland	Urfer, Howard R.	Maj.
Roseburg	Dillard, Louis A.	Maj.
Salem	Schmidt, Louvera B.	Capt.
Williamette	Thornberry, Wayne W.	Maj.

Pennsylvania

Ambridge	Zamba, Peter	Capt.
Ardmore	McNally, Vincent P.	Maj.
Ashley	Gatusky, Charles R.	Capt.
Beaver Falls	Lenk, Abe Sol	Capt.
Butler	Brandberg, Guy A., Jr.	Capt.
Cameron	Herring, Charles P.	Capt.
Carlisle	Grossman, Bernard L.	Capt.
Clarks Summit	Hand, Robert F.	Capt.
Claysville	Knox, Robert W.	Capt.
Clearfield	Silverstein, William	Capt.
Cumberland	Shedlosky, Leon S.	Capt.
Downington	Reed, William A.	Capt.
DuBois	Kimble, Earl C.	Capt.
Dunbar	Guie, Edwin B.	Capt.
Easton	Bixler, Merritt D.	Maj.
Easton	Serfass, William A.	Capt.
Emporium	Lathrop, Laurence L.	Lieut.
Erie	Kamler, Francis R.	Maj.
Erie	Lett, Walter D.	Capt.
Erie	Sample, Rollo J.	Lt. Col.
Eynon	Shamorsky, E. P.	Lieut.
Grafton	Willitts, Adelbert J.	Capt.
Hanover	Jarin, Isadore J.	Capt.
Hanover	Reed, Allen J.	Capt.
Harrisburg	Eckman, Mark L.	Capt.
Harrisburg	Hollenbach, Albert M.	Maj.
Hummelstown	Deimler, John L.	Maj.
Irwin	Kifer, John J.	Maj.
Johnstown	McAneny, Joseph B.	Lieut.
Johnstown	Skinner, Maurice D.	Capt.
Lancaster	Hoagland, George D.	Capt.
Lansford	Wasilko, Julius D.	Capt.

Leechburg	Cook, Herbert T.	Capt.
Leechburg	Rose, Earl A.	Maj.
Library	Pennington, Jess A., Jr.	Maj.
McKeesport	Gold, Simon	Capt.
McKeesport	Silberman, Alfred J.	Capt.
McSherrytown	Keffer, George I.	Capt.
Meyersdale	Cover, William P.	Capt.
Monessen	Meybin, Harold F.	Capt.
Monessen	Shire, Irving P.	Maj.
Monongahela	Simms, James E.	Maj.
Mt. Lebanon	Garman, Carl R.	Capt.
Nanty-Glo	Porais, Charles F.	Lieut.
New Castle	McFate, Thomas J.	Lieut.
New Castle	Weber, Harry R., Jr.	Maj.
Norristown	Neiman, Kenneth E.	Maj.
Norwood	Pietsch, Albert G.	Capt.
Oxford	Rairigh, Max A.	Capt.
Pen Argyl	Jordon, Lester E.	Lieut.
Philadelphia	Allen, Albert A.	Capt.
Philadelphia	Blasberg, Everett G.	Capt.
Philadelphia	Bloom, Sidney S.	Capt.
Philadelphia	Chervenka, Emil J.	Capt.
Philadelphia	Cohen, Jacob L.	Capt.
Philadelphia	Cohen, Lester M.	Capt.
Philadelphia	Cook, Thomas J.	Col.
Philadelphia	Cramer, Manuel G.	Maj.
Philadelphia	Diamond, Aaron	Capt.
Philadelphia	Dimmer, Jack E.	Capt.
Philadelphia	Ezerman, Willem	Capt.
Philadelphia	Faye, Sigmund F.	Capt.
Philadelphia	Finkelman, Ellis	Maj.
Philadelphia	Garver, Charles K.	Maj.
Philadelphia	Gilden, C. T., Jr.	Lt. Col.
Philadelphia	Goodhart, Robert R.	Capt.
Philadelphia	Gosman, Solomon D.	Capt.
Philadelphia	Graitcer, David L.	Capt.
Philadelphia	Grayboyes, Morris W.	Capt.
Philadelphia	Greene, Harry J.	Capt.
Philadelphia	Grubb, Paul A.	Capt.
Philadelphia	Hare, Robert W.	Capt.
Philadelphia	Kaplan, Oscar S.	Capt.
Philadelphia	Kuiper, Klaudius	Capt.
Philadelphia	Lamm, Herman R.	Maj.
Philadelphia	Lee, Clarence T.	Capt.
Philadelphia	McConnell, James C.	Capt.
Philadelphia	Neri, Felix, Jr.	Capt.
Philadelphia	Perry, William	Lt. Col.
Philadelphia	Schmidt, Stephen E.	Capt.
Philadelphia	Seltzer, Samuel	Lt. Col.
Philadelphia	Spector, Aaron	Capt.
Philadelphia	Spector, Morris T.	Capt.
Philadelphia	Stevens, Ford W.	Maj.
Philadelphia	Torreti, Egidio F.	Lieut.
Philadelphia	Werther, Lester	Capt.
Philadelphia	Wolford, Donald R.	Capt.
Phoenixville	Ehrenkranz, Harry I.	Lieut.
Pittsburgh	Bitar, Nicholas H.	Maj.
Pittsburgh	Blain, Milton	Lieut.
Pittsburgh	Contestabile, R. C.	Capt.
Pittsburgh	Dakin, John I.	Maj.
Pittsburgh	Dietrich, Frank D.	Lieut.
Pittsburgh	Fassinger, James J.	Maj.
Pittsburgh	Gerlach, Claude J.	Capt.
Pittsburgh	Patton, James C.	Maj.
Pittsburgh	Ratowsky, William	Maj.
Pittsburgh	Uram, Michael A.	Capt.
Pottsville	Donohue, Joseph C.	Capt.
Reading	Bohn, J. Russell	Maj.
Reading	Kaplan, Bernard	Capt.
Reading	Schneiderman, H. W.	Maj.
Reading	Williams, Frederick J.	Capt.
Ridgway	Jack, Clyde A.	Capt.
Roseto	Pinto, Anthony R.	Lieut.
St. David	Brandon, Benjamin, F.	Capt.
St. Michael	Boucher, John D.	Capt.
Scranton	Pollan, Seymour	Capt.
Spring Grove	Zeiders, Ralph B.	Capt.
Springs	Davis, Darrell W.	Capt.
Stroudsburg	Cohen, Sidney	Capt.
Sunbury	Messner, Leon M.	Capt.
Tower City	Bressler, Raymond E.	Capt.
Warren	Maneval, Robert C.	Maj.
Wellsboro	Fox, Louis I.	Capt.
West Lawn	Deibert, Harry E.	Capt.
Williamsport	Knights, Edward B.	Capt.
York	Breuer, Arthur N.	Capt.
York	Eck, Jules J., Jr.	Capt.
Puerto Rico		
Aguadilla	Reichard, Roger	Capt.
Ponce de Leon	Nin, Luis L.	Capt.
Rio Piedras	Pastrana, M. A., Jr.	Capt.
Rhode Island		
Edgewood	Litchman, Burton	Capt.
Kingston	Coggins, Calvin R.	Capt.
Pawtucket	Savoie, Donat L.	Lieut.
Providence	Biderman, Morris L.	Lt. Col.
Providence	Fishbein, Joseph G.	Capt.
Providence	Geoghegan, Leo F.	Capt.
Providence	Kamaras, Raymond G.	Capt.
Providence	Kershaw, Everett R.	Lieut.
Providence	Lapolla, Raymond R.	Maj.
Providence	Rouslin, Samuel	Capt.
Providence	Woiler, Gilbert	Capt.
Woonsocket	Narcessian, Hurach P.	Lieut.
South Carolina		
Batesburg	Taylor, Dwight L.	Capt.
Beaufort	Lipsitz, Hyman D.	Capt.
Columbia	Hart, George C.	Capt.
Greenville	Crane, James T.	Capt.
Grossnore	Sloop, William M.	Maj.
Spartanburg	Dunbar, Paul A.	Capt.
Spartanburg	Johnson, Benton R.	Capt.
South Dakota		
Avon	Bangert, Elgin T.	Lt. Col.
Canova	Shaeffer, John F.	Capt.
Faith	McClellan, Herbert F.	Maj.
Kimball	Cady, Harold R.	Lt. Col.
Lake Preston	Hesby, Ernest K.	Maj.
Lennox	Straup, Perry D.	Capt.
Milbank	Schlosser, Stanley M.	Capt.
Spearfish	Ward, Floyd R.	Capt.
Tennessee		
Chattanooga	Austin, Garnett W.	
Chattanooga	Hunt, Slayden V.	Capt.
Chattanooga	Laws, Hirman A., III	Maj.
Chattanooga	Warren, Enoch H., Jr.	Capt.
Clarksville	Hahn, Paul B.	Capt.
Daisy	Owens, Edward A.	Capt.
Denver	Powers, William M.	Lieut.
Dyersburg	Guttery, John M., Jr.	Capt.
Fayetteville	Crawford, Reuben T.	Capt.
Greeneville	Broyles, Isaac E.	Capt.

Jackson	Dowling, Thomas J.	Lt. Col.
Johnson City	Fields, Ray W.	Capt.
Knoxville	Book, William H.	Capt.
Lewisburg	Bennett, R. L.	
Lookout Mt.	Austin, William G.	Capt.
Madison	Garvin, Sifford C.	Capt.
Memphis	Avery, William B.	Capt.
Memphis	Battle, Joseph M.	Capt.
Memphis	Binford, Arthur L., Jr.	Lieut.
Memphis	Cockroft, W. B.	
Memphis	Dye, Kenneth P.	Capt.
Memphis	Jones, Fred J.	
Memphis	Prewitt, Malcolm L.	Maj.
Memphis	Ries, James L.	
Memphis	Sherman, Phillip	
Memphis	Yergin, Harry I.	Capt.
Nashville	Bogle, Robert B., Jr.	Capt.
Nashville	Carter, Bowen C.	Capt.
Nashville	Ellis, Carl E.	Maj.
Nashville	Fitzwater, James E.	Maj.
Nashville	Minor, Joe	Lt. Col.
Newbern	Harris, E. S.	
North Cleveland	Rogers, Roger P.	Capt.
Ridgely	Stephens, George J.	
Ripley	Bolin, R. M.	
Tiptonville	Eleazer, Luther E.	Lieut.
Whitlock	Wahl, Lewis F.	Capt.

Territory of Hawaii

Honolulu	Ching, Robert C.	Capt.
Honolulu	Halm, Gilbert C. N.	Capt.
Honolulu	Rodriques, Raymond J.	Maj.
Honolulu	Young, Paul K. H.	Lieut.

Texas

Abilene	Bowers, William H.	Maj.
Amarillo	Makeig, John W.	Capt.
Austin	Locker, Lewis H.	Lt. Col.
Beaumont	Pecora, Samuel V.	Capt.
Brownwood	Brewer, Jerome E.	Capt.
Bynum	Jones, Marshall L.	Lt. Col.
Corpus Christi	Meehan, Thomas C.	Capt.
Dallas	Allred, Leo W.	Lt. Col.
Dallas	Elliott, Edward W.	Capt.
Dallas	Killebrew, A. L. J.	Capt.
Dallas	Llewellyn, Clarence D.	Maj.
Dallas	Wood, Homer D.	Capt.
El Paso	West, Lionel M.	Lt. Col.
Floresville	Oxford, James W.	Lieut.
Fredericksburg	Borchers, Chester H. E.	Maj.
Gainesville	Truitt, John W.	Capt.
Garland	Fouts, Andrew S.	Maj.
Harlingen	Frush, Richard W.	Capt.
Harris County	Glaros, John M.	Capt.
Houston	Blackaller, Gale E.	Capt.
Houston	Moers, George W.	Capt.
Houston	Morris, Glenn S.	Lt. Col.
Lampasas	Smith, Lloyd S.	Maj.
Lufkin	Clark, Eddy T., Jr.	Maj.
Madisonville	James, John A.	Capt.
Mt. Vernon	Stinson, David L.	Capt.
Paris	Aurbach, Frederick	Capt.
Rosenberg	Stavinoha, Cyril L.	Capt.
San Antonio	Brookreson, Kendrick	Maj.
San Antonio	Hearn, Howard R.	Capt.
Sealy	Vykoukal, Frank E.	Maj.
Temple	Whisennand, Hartwell	Capt.
Tyler	Edelman, William	Capt.
Tyler	Hagan, Grady C.	Maj.
Victoria	Rogers, John T.	Capt.
Waco	Jenkins, Frederick G.	Capt.
Waco	Powell, Daron H.	Capt.
Waco	Stiteler, R. H., Jr.	Capt.
Wolfe City	McDonald Thomas M.	Maj.
Woodville	Nellius, Martin F., Jr.	Capt.

Utah

Fountain Green	Oldroyd, Reed I.	Lieut.
Ogden	Malan, Howard S.	Maj.

Vermont

Barre	James, Claire M.	Lieut.
Rutland	Reardon, William J.	Capt.
St. Brandon	Amley, Arnold O.	Capt.

Virginia

Arlington	Brooks, Howard S.	Maj.
Bassett	Lipford, Sanford A.	Maj.
Charlottesville	Farrell, Clement A.	Capt.
Clifton Forge	Rudisill, John W., Jr.	Capt.
Marion	Wolfe, Samuel C.	Capt.
Norfolk	Reed, James W.	Maj.
Richmond	Bear, David M.	Capt.
Richmond	Jenkins, William W.	Maj.
Richmond	Logan, Ralph A.	Maj.
Richmond	Mulieri, Joseph B.	Maj.
Richmond	Smith, John L.	Capt.
Roanoke	Nolan, James I.	Capt.

Washington

Anacortes	Rose, Virgil L.	Maj.
Bellingham	Eberhart, John H.	Maj.
Castle Rock	Windham, Jesse L.	Maj.
Clarkston	Cassell, Everett J.	Capt.
Foldendale	West, William H.	Capt.
Lynden	Cook, John	Capt.
Seattle	Vandewall, George L.	Capt.
Spokane	Camp, Carl M.	Lieut.
Tacoma	Grigal, Raymond W.	Capt.
Tenino	Johnson, Clifford I.	Maj.
Yakima	Moffat, John C.	Capt.

West Virginia

Charleston	Schaffer, Philip F.	Lt. Col.
Huntington	Kincaid, Hunter C.	Capt.

Wisconsin

Green Bay	Townsend, Wayne W.	Maj.
Evansville	Libby, Ore G.	Capt.
Lomira	Sterr, Ambrose M.	Capt.
Milwaukee	Dubin, Wilfred S.	Capt.
Milwaukee	Emanuel, Elmer J.	Capt.
Milwaukee	Gabert, Lawrence W.	Maj.
Milwaukee	Schroeder, Arnold W.	Lieut.
Milwaukee	Wittig, Robert E.	Capt.
Neenah	Landskron, Walter F.	Capt.
Oconto Falls	Titel, Fred C.	Lt. Col.
Racine	Gearen, Walter D.	Lt. Col.
Racine	Ricchio, Alfred O.	Capt.
Sheboygan	Esser, William J.	Maj.
Wauwatosa	Hoffman, Walter F.	Capt.
Wauwatosa	Walk, Willard P.	Capt.

Wyoming

Buffalo	Misner, Elza L.	Capt.
Hanna	Hoel, Paul W.	Capt.
Rock Springs	Menghini, Renaldo R.	Maj.
Torrington	Kildebeck, Orval C.	Capt.

BOOK REVIEWS

Penicillin Therapy Including Tyrothricin and Other Antibiotic Therapy. By John A. Kolmer, M.S., M.D., Dr. P.H., ScD., LL.D., L.H.D., F.A.C.P., Professor of Medicine in the School of Medicine and the School of Dentistry, Temple University; Director of the Research Institute of Cutaneous Medicine; formerly Professor of Pathology and Bacteriology, Graduate School of Medicine, University of Pennsylvania. 302 pages. Price $5. New York: D. Appleton-Century Company, 1945.

For the reader who wishes to obtain a broad impression of the current knowledge of the production, testing, properties, actions and uses of penicillin, this book will be interesting and rewarding. The author abstracts the findings of a great number of investigators and adds suggestions of his own for further research. He has recorded an enormous amount of detailed information in easily readable form.

In addition to penicillin and tyrothricin, gramicidin S, streptothricin, patulin and chlorophyll, their properties and applications are discussed briefly. The chapter devoted to penicillin and tyrothricin therapy in relation to dentistry and oral surgery consists of only six pages, in which methods of administration and clinical applications are discussed. In view of the limited research on the dental applications of penicillin, it is not surprising that only a small portion of the book is devoted to dental uses. However, many of the general uses are applicable to oral conditions. For example, dental readers will probably be interested in the chapter on penicillin in the treatment of streptococcal diseases, which includes several pages on subacute bacterial endocarditis.

Dr. Kolmer's book should be interesting and instructive to practicing dentists as well as to dental research investigators.—*Donald A. Wallace.*

A Manual of Surgical Anatomy Prepared Under the Auspices of the Committee on Surgery of the Division of Medical Sciences of the National Research Council. By Tom Jones and W. C. Shepard. Philadelphia and London: W. B. Saunders Company, 1945.

This book starts with an introduction, two forewords, a preface and an author's preface. The forewords, written by the Surgeon Generals of Army and Navy, extol the book as a "splendid manual . . . . a valuable, if not indispensable, reference for the military surgeon," a book that "can be neither expanded nor condensed." The drawings, "which for accuracy and simplicity may be considered unsurpassed," are highly praised. If one passes from these glowing phrases to the atlas itself, one experiences a great disappointment. Generally speaking, the drawings or their reproductions are entirely flat and lifeless. Many are so hazy that, instead of clarifying, they can only confuse (e.g., pages 3, 5, 10, 34, 60A, 71, 76, 77, 78, 80 and 82). No book is free of errors, but the mistakes in drawings and labeling in this atlas are too numerous to be put down to the work of a printer's gremlin and they cannot be laid on the doorstep of Dr. Zimmermann, who is credited by the authors with having checked the plates for anatomic accuracy, but, according to his own statement, was consulted only occasionally.

The following list contains only the more important errors:

Page 3: "Post. clinoid process" is

the dorsum sellae. The "Sup. petrosal sulcus" is invisible.

Page 5: "Supraorbital a." The line ends on the eyeball.

Page 7c: Buccinator and internal pterygoid seem to be connected.

Page 9: The division of the common carotid artery is incorrect.

Page 11: The vertebral artery passes through the transverse foramina of all the cervical vertebrae.

Page 14: The "optic n. (2nd cranial)" (sixth label on the left) is the olfactory nerve.

Page 16: "2, fissure orbitalis inferior" is not a "foramen through which these veins enter the cranium." No explanation for "10."

Page 17: The occipital sinus is missing in the posterior view.

Page 22B: "Collum mallei" is the processus brevis mallei.

Page 26: The picture of the laryngeal inlet is entirely wrong; "vocal cord" is possibly the ventricular fold, or the latter was omitted.

Page 27: The subclavian artery seems to descend vertically into the chest.

Page 28: No explanation for 3, 4, 5, 6.

Page 29: The right recurrent nerve is missing. "Inf. thyroid v." is the middle thyroid vein.

Page 30: "Glossopharyng.n." (first label on left) is unidentifiable, but not the glossopharyngeal nerve. Costo-cervical trunk and its branches are missing.

Page 32: "Phrenic n." is inside the carotid sheath.

Page 38: The "lumbar trigone" is placed in the gluteal region instead of above the iliac crest.

Page 45: The nerves for the ciliary ganglion supply not only the constrictor of the pupil, but also the ciliary muscle (muscle of accommodation).

Page 48A: "Trans. process (C_3)" is the articular process.

Page 45: "R. atrium" is the left ventricle.

Page 50: The lungs are not shown in expiration and inspiration. The respective lines are the pulmonary and the pleural boundaries.

Page 51: "Right ventricle" in the posterior view is the left ventricle.

Page 52B: The direction of the right and left bronchi is reversed. The steeper course of the right bronchus is of great clinical importance.

Pages 59 and 60B: The right gastric artery arises normally above the gastroduodenal artery.

Page 62: The relation of the branches of the celiac artery is entirely wrong.

Page 67: "Sacrotub. lig." is the sacrospinous ligament.

Page 72: "Middle plane" is the midsagittal plane.

Page 73A: "Ant. mediastinum" is the right costomediastinal sinus.

Page 82: "Perineal fat" is the perirenal fat.

Page 88: "Flex.dig.subl.m." includes the long palmaris muscle.

Page 89: "Brachialis m." is the brachioradialis muscle. "Abd.pol.brev. m." is the extensor pollicis brevis muscle. "Exten.carpi rad.brev.m.(Tend.)" is the extensor carpi radialis longus tendon.

Page 91: The position of the superficial and deep volar arches is reversed. The superficial arch is distally from the deep arch.

Page 93: "Subclavicular a. and v." are the subclavian artery and vein.

"Intercostobrachial a. and v." are the lateral (long) thoracic vessels.

Page 95: "Brach.n." is the radial nerve.

"Med.head" is the lateral head of the triceps muscle.

Page 98: "Opponens m.(V)" is part of the flexor brevis digiti quinti.

In the posterior view, the tendon of the extensor pollicis longus should continue to the first phalanx.

Page 101: The deep volar arch ben-

lies superficially from the superficial volar arch.

Page 103: "Trans.scap.a." is the posterior circumflex humeri artery.

"Pect.major m." is not the structure indicated by the label.

Page 104: "Lat.condyle of humerus" is the lateral epicondyle of the humerus.

Page 113: The cuneiform bones are numbered in reverse order.

Page 122: "Semitendinous m." and "semimembranous m." are reversely labeled.

Page 123: "Tibialis post.m.(tend.)" (last label on left in lower figure) is the flexor hallucis longus tendon.

Page 125: The lower figure does not represent a "median sagittal," but a central longitudinal section through the knee.

Page 138: Knee: The "lateral epicondyle" is the lateral condyle of the femur.

Is this list of errors not too long for a book "unsurpassed for accuracy"?—*Harry Sicher.*

Health Teaching Syllabus for the Junior and Senior High Schools. Health Education Series Bulletin No. 3. 284 pages. Illustrated. Paper. Albany: The University of the State of New York Press, 1944.

The units of study in this syllabus were prepared by a state health teaching committee under the direction of the New York State Division of Health and Physical Education. In preparing each unit, the committee endeavored to select the goals and learning activities most likely to result in improvement in health practices and the health status of high school pupils. At the junior high school level, special emphasis is placed on hygiene, while basic physiology and anatomy have received greater stress in the units of study for the senior high school. The syllabus is distributed to New York schools as a practical aid to administrators and health teachers in establishing local health teaching programs.

The bulletin, designed to present material for the basic course in health required by the New York Regents, covers three areas: school health service, hygiene of the school plant and health education. The authors stress the fact that "the teaching of health in the high school requires a time, a place and a qualified teacher."

The syllabus is in two parts. The first presents health teaching units for the junior high school, the second units for the senior level. Dental health is covered in both sections. The section on dental health for juniors has a number of subsections dealing with the objectives of the course; basic information to be acquired; suggestions for initiating the unit; pupil problems and activities; evaluation of results and a list of references. The subheadings for the senior unit are of a similar nature. The references for both dental units are particularly well chosen.

School administrators, health teachers and health officials will find this health teaching syllabus very helpful. It will be of particular interest to the dentist who is interested in public dental health.—*Lon W. Morrey.*

What to Do About Vitamins. By Roger J. Williams, Ph.D., Director of the Biochemical Institute of the University of Texas. 56 pages. 34 illustrations. Cloth. Price $1. Norman: The University of Oklahoma Press, 1945.

This book contains much common sense in the way of advice to the laity about human nutrition. It stresses the importance of obtaining vitamin requirements from the diet rather than from the drug store and makes constructive suggestions for estimating the amount of proteins, vitamins and minerals in the diet. It contains only one obscure refer-

ence to the dental aspects of nutrition.

Undue emphasis is placed on the importance of vitamin D and pantothenic acid in adult nutrition. More than minimal amounts of vitamin D have not been shown to be essential for normal adults. Pantothenic acid has not been shown to be necessary or desirable for adults.

It is not made sufficiently clear how and why the vitamin and mineral requirements of adults differ from those of children. Since the book is apparently intended to aid adults in estimating their own vitamin and mineral requirements, and the recommendations are those for children, unnecessary emphasis is placed upon the amount of vitamins and of minerals which are necessary for growth and development. Relatively less emphasis is placed on the usefulness of vitamins and minerals for maintenance.

The book is well written and, despite the minor inadequacies mentioned, should provide interesting and profitable reading for the layman, to whom it is directed.—*Donald A. Wallace.*

Teaching in Colleges and Universities (with Special Reference to Dentistry). By Lloyd E. Blauch, Senior Specialist in Higher Education, U. S. Office of Education; formerly Executive Secretary, Curriculum Survey Committee, American Association of Dental Schools. 341 pages, with twenty-one illustrations. Price $2.50. Indianapolis: American Association of Dental Schools, 1945.

This book was prepared with the assistance of funds remaining from those given to the Curriculum Survey Committee of the American Association of Dental Schools by the Carnegie Corporation of New York for preparing the dental curriculum report, "A Course of Study in Dentistry" (1935).

The dental profession is to be complimented on producing what might well be considered the first book in special methods at the higher education level. Higher education has always thought of itself as the teacher and guide for all education at the lower levels of specialization and attainment. In its zest for guiding the elementary school and secondary school teacher in the best methodology of instruction, it has never thought that it itself needed any instruction. Witness also the fact that, while recognized experimentation in methodology fills journals, there is little true evaluation and research in the best methods to be used in teaching at the higher education level.

The Curriculum Survey Committee and its writers chose well when they decided to bring together, for the enlightenment of their profession, various facts, theories and impressions which they believe might give to the dental instructors a better idea of their objectives and the tools of their trade as pedagogues. There may be others who will question the committee's wisdom in titling the book as they did. Dentistry, or at least the "professional" areas as such, rightly deserves recognition on the cover and not in small print inside. Higher education will applaud this book in methodology as much as will the dental profession, if not more so, when it recognizes that the book has been written with particular areas and subject matter in mind. Professors in fields such as law, engineering, education and medicine itself will not be slow to recognize that a book devoted to the methods of dentistry will have a great deal of interest to themselves.

After the introductory chapter, the author describes, with up-to-date documentation, some of the concepts of learning which he believes should be of general interest to the pedagogue. He manages to include in these relatively brief discussions and expositions a tremendous amount of useful information. A few may criticize his motive and his method, but if they sense his objectives they will agree with this reviewer that he has done an

unusually difficult job in a very fine way. There are many who pass themselves off as educators today who would do well to review again the theories and concepts that Blauch reviews for consideration in these five chapters. This reviewer sees topics that he wishes the author had expanded and senses conclusions that he believes will not be obvious, but, in view of the fact that this book was not intended to be an encyclopedic treatise, the author has chosen his material dexterously.

Relatively little is said about dentistry in the first six chapters, for the author leaves the applications to dental education to the chapters which follow. In some instances, the author could have explained his selected principles of learning more easily if he had introduced more dentistry in the earlier chapters. However, the chapters describing special methods of instruction which apply to dentistry are well written, and perhaps something has been gained by packing most of the dental applications into the last two-thirds of the book. Some of the chapters in the latter section of the book have been prepared by the author, whereas others have been written by his associates, Willard C. Fleming, George B. Denton, J. Ben Robinson, Frank H. Cushman and Ray V. Smith. In these chapters, the use of lectures, laboratory demonstrations, visual aids and other teaching devices is discussed with specific reference to dentistry. Two chapters are also included describing methods of preparing achievement tests and discussing the progress that has been made in the field of aptitude testing in dentistry. The six collaborators have done an excellent job in condensing a great deal of valuable information into a relatively small space. They demonstrate well their acquaintance with the special areas assigned to them and certainly display a competence in the field of dental education. Each chapter contains numerous helpful references to the literature, and these, in turn, include the most recent books in their respective fields.

It should be remembered that this book was not intended to be a reference book, but instead it serves the much needed purpose of providing a good review of educational psychology and methodology as they apply to professional education.—*Shailer Peterson.*

The Road to Community Reorganization. By a Committee of Consultants of the Woman's Foundation. 32 pages. New York: Woman's Foundation, 10 East Fortieth St., 1945.

Under the sponsorship of the Woman's Foundation, the problems of community life in the United States were examined by a committee of nationally prominent specialists in the fields of education, health, welfare and recreation, labor and management and the general public. The booklet under review reports the results of the studies and the recommendations of the committee.

Four years of war have had a destructive influence on the family and community. More than ten million persons have served in the armed forces; five million more were notified of physical and mental disabilities. Approximately twenty million adults and children have migrated from their homes to industrial areas. Community services have been modified and disrupted. New problems have developed and some old ones magnified because of neglected physical illness, inadequate education, malnutrition and racial tension. The committee studied the many problems involved from the standpoint that both public and private agencies of education, health, welfare and recreation must work together in the closest harmony for the reconstruction of community services.

The committee expressed the view that communities fail to meet their responsibilities because of lack of recognition of community needs, provincialism, lack of leadership and personnel, inade-

quate financing or defective organization. To overcome these deficiencies the committee recommends:

The organization for every community of coordinating bodies of representative citizens designed to study, analyze, strengthen and extend community services in education, health, recreation and welfare as needed.

The establishment for every community of Community Service Centers or of Information and Referral Centers to aid in the coordination of services and to provide readily accessible information, advice and service to individual citizens and families.

The recruiting and selection of both volunteer and professional personnel, properly, efficiently and humanely to administer community services.

Improved financing of community services in cooperation with state and federal agencies, both public and private.

A re-awakening of the citizen to his rights, obligations and opportunities to contribute to his own development and the welfare of all the people of his community.

Continuing emphasis on the concept that the welfare of all the people is the concern of all the people.

The booklet was probably not meant to be a complete treatise on the technics of community organization, nor does it provide such information. It does point up the need, created by four years of war, for immediate action in the reorganization of all essential community services. —*Allen O. Gruebbel.*

Spies and Traitors of World War II. By Kurt Singer. 295 pages. Price $2.75. New York: Prentice-Hall, Inc., 1945.

In spite of the fact that, with the rather abrupt termination of the war, the material making up this book already seems out of date, with its speculations as to what Hitler may do and its references to arch spies as still in circulation and at work, the stories are, paradoxically perhaps, now to be classed as escape literature along with the most fascinating tales of Allingham, Sayers and Eberhardt. To many readers, the fact that the stories outdo crime fiction in melodrama will be of secondary interest to the knowledge that even the most incredible have been "double checked for accuracy." The story of these sinister figures is history—"thriller history."—*B. L. Kime.*

Anatomy as a Basis for Medical and Dental Practice. By Donald Mainland, M.B., Ch.B., D.Sc., F.R.S.E., F.R.S.C. Medical Students Series. New York and London: Paul B. Hoeber, Inc., 1945.

Every teacher of anatomy in a medical or dental school has felt the almost insuperable difficulties of too little time and too large textbooks. If we add the difficulties arising from the necessity to start the teaching of anatomy in the dissecting laboratory and the divergence of regional anatomy here and systemic anatomy in the textbooks, we cannot be surprised that teachers and students had to take refuge in "manuals," "guides" and similar aids which gave but a semblance of real help. Publication of a new textbook of anatomy, adapted to the needs of the American student, was a hoped-for event. It is here at last. Mainland's book is not only new in its concept: it is a good and a courageous book, the book of a true teacher. It is the work of a man who has not only realized that the student has to be taught applicable anatomy but who also had the courage to write applicable anatomy. It is, furthermore, anatomy of the living which Mainland tries to teach; therefore, advice is given to observe structures and their action on the living subject wherever possible.

The first part, anatomy and education, should be read by every teacher not only of anatomy, but also of any other theoretical subject. Teachers of anatomy should especially note what Mainland says about one trend in modern anatomic

teaching: "The replacement of unnecessary details of gross anatomy by other details, many of which are equally unnecessary to the practitioner—details of development, of genetics, of the hormonal control of tissues, and even of experimental details." Hormones and experiments are so much more glamorous than anatomy!

The second part, general anatomy, is a welcome introduction, to be studied to the best advantage before the laboratory work starts. The chapter "The Body as a Whole" is especially well written, giving information rarely found in a textbook of anatomy.

The following parts, devoted to the regional anatomy of the human body, stress functional aspects and clinical application, making stimulating and interesting reading in spite of the author's remark that "much of this portion of the book will appear as dull as a street directory."

There is, of course, enough material in this book for a lively discussion because it is very personal. That it expresses the personal views of the author is not meant as a criticism. On the contrary, a textbook, like a lecture, has to be subjective to a degree if it is not to be colorless. There are limits to this justified individualism. If these limits are passed, the book is too much a one man's book. The selection, in fact the inclusion, of questions and answers stresses too much the personal viewpoint of the author. Many of the questions are formulated in a way that is not too clear; but, in reading the answers, one can easily understand how the author in his personal instructions during lectures evidently prepares the way for just these questions and their wording. It might have been better to have omitted the questions and answers and to have incorporated in the text the material which they cover.

The section on "Bones," especially that on the "factors influencing bone structure," is one of the sections open to argument. The author's criticism of the functional adaptation of bone structure seems not only one-sided, but also confusing to the beginner. Arguments could also be raised against the section on movements of the jaw. The external pterygoid muscle is called a muscle of depression and is regarded as the principal opener of the jaws. Although its role in the opening movement is obvious, it is an opener only if it acts under simultaneous tension of the suprahyoids and relaxation of the masseter, temporal and internal pterygoid.

These and other possible arguments cannot detract from the value of this book. Only one more remark on the subtitle seems to be necessary. It asserts that the book is "a basis for medical and dental practice." This book is excellent for the student of medical or dental school, providing the foundation of anatomic knowledge. The dental practitioner is not to be likened to the general medical practitioner, but to the medical specialist. He needs a much more intimate and detailed anatomic knowledge of the restricted field in which he works. What he can learn in even the best course and from the best textbook in anatomy can never enable him to understand the anatomic basis of local anesthesia. Special studies are here imperative. This special knowledge has to be based on a real understanding of general anatomy, and Mainland's book gives just this: an intelligent selection and interpretation of the anatomic facts.—*Harry Sicher.*

CURRENT LITERATURE

Effect of Bite Wing Roentgenograms on Navy Dental Examination Findings. James M. Dunning and George W. Ferguson. U. S. Nav. M. Bull. 46:83, January 1946.

A total of 100 midshipmen were given careful examinations by explorer, supplemented by one pair each of posterior bitewing roentgenograms in order to measure the efficacy of explorer examination technic and to study means of improving the examination. The use of the roentgenograms increased findings of dental caries in the entire mouth by 78 per cent over the findings by explorer alone. In the posterior proximal areas, the roentgenograms yielded an increase of 215 per cent over the explorer findings. Of ninety-eight "urgent" posterior proximal lesions (requiring immediate attention to avoid pulp involvement), only thirty-nine were found by explorer alone while the other fifty-nine were found by roentgenograms alone. These findings lead to the conclusion that the use of roentgenograms is warranted even when operative dentistry of only the most urgent nature can be undertaken.—*S. Wah Leung.*

Considerations on the Oral Manifestations of Diabetes Mellitus. Luis Clerici. Rev. d. Circ. odontologico de Rosario, Argentina 17:57, 1945.

A thorough review of the available bibliography on oral manifestations of diabetes mellitus is followed by a report on a clinical and roentgenographic study of the oral manifestations of thirty-six diabetic patients from 11 to 68 years of age, with different prognoses and varying levels of oral hygiene. In diabetic patients, the oral manifestations were more evident when the glycemia was above 250 mg. per cent and when acidosis was present. In patients more than 30 years of age who have had the disease for more than three years without previous treatment and who have hyperglycemia and acidosis, it was possible to find marked alveolar atrophy, hypertrophy and bleeding of the gums, gingival ulcerations, gingival abscesses, abundant calculus and granulation tissue partially covering the teeth. The tongue was generally covered with a thick coating and presented a reddened margin with indentations made by pressure against the teeth. Patients more than 30 years of age who had received antidiabetic treatment presented atrophic and slightly edematous gums, with the other symptoms mentioned above absent or greatly reduced. In patients who observed rigorous oral hygiene, the osseous atrophy was less accentuated. The majority of the patients more than 50 years of age had lost most of their teeth. The diabetic patients, as a whole, exhibited numerous cavities, glossodynias, neuralgias and alveolar atrophy, the atrophy being especially of the horizontal type. The author finally suggests that, whenever a patient exhibits alveolar atrophy, especially if the condition is accompanied by periodic loosening of the teeth, an analysis of his blood and urine should be made in order to discard the possibility of his being diabetic.—*H. Granados.*

A Case of Congenital Xerostomia. M. Faber. Acta paediat. 30:148, 1942.

A 13-year-old boy presented a history of dryness of the mouth and pronounced dental caries. At the time that the boy was 1½ years of age, the deciduous teeth were so severely attacked by dental caries that they seemed to melt away. At 2 years, the patient developed a pronounced stomatitis, which seemed to aggravate the dryness. The permanent teeth erupted normally but in a few years likewise began to show the results of a severe carious process. The parotid glands and Stensen's duct could not be detected on physical examination. Local administration of sugar and subcutaneous injection of pilocarpine resulted in the production of an extremely small amount of highly mucinous secretion.—*J. E. Gilda.*

Journal of Dental Research
February 1945

Subjects marked with an asterisk are reviewed below.

Effect of Subanesthetic Nitrous Oxide-Oxygen Mixtures on Pain Sensitivity of the Tooth. Alfred H. Chambers and George G. Schultz, University of Pennsylvania.—1.

Clinical Observations on Pigment Variations in Healthy Oral Tissues of the Negro. Clifton O. Dummett, Meharry Medical College.—7.

Bacteriological Appraisal of Adhesive Denture Powders. Henry A. Bartels, Columbia University.—15.

Changes in the White Cell Count Following Tooth Extraction in Albino Rats and Rabbits. George J. Anday and Ralph L. Ferguson, Loyola University, Chicago, Ill.—17.

Studies on the Fermentation of Sorbitol by Oral Microorganisms. Thomas C. Grubb, University of Maryland.—31.

Radioactive Phosphate Absorption by Dentin and Enamel. Gerrit Bevelander and Melvin H. Amler, New York University.—45.

*Low Calcium Diet: Dental Effects. C. A. H. Smith and R. F. Light, New York.—53.

Journal of Dental Research
April 1945

Subjects marked with an asterisk are reviewed below.

*Effect of Vibration upon the Dental Pulp and Periosteum of White Rats. J. S. Restarski, National Naval Medical Center.—57.

Comparison of Specific Gravities and Hardness of Cohesive Gold Foil Malleted with Various Types of Condensors. C. W. Strosnider, Ohio State University.—61.

Changes in the Composition and Setting Characteristics of Plaster of Paris on Exposure to High Humidity Atmospheres. Alan S. Buchanan and Howard K. Worner, Australian College of Dentistry.—65.

A Study of the Angle of the Mandible. J. A. Keen, University of Cape Town.—77.

*The Role of Actinomyces Israeli in Salivary Calculus Formation. Sherman Ross Citron, Columbia University School of Dental and Oral Surgery.—87.

*Transplantation of Developing Tooth Germs in the Mandible of the Cat. Harry H. Shapiro and Bernice L. Maclean, Columbia University and Hunter College.—93.

*The Effects of Various Ions on Enamel Solubility. Michael G. Buonocore and Basil G. Bibby, Tufts Dental College.—103.

The Relationship Between Microscopic Enamel Defects and Infantile Debilities. Marvin Sheldon, Basil G. Bibby and Michael S. Bales, Tufts Dental College.—109.

Scientific Proceedings of the New York Section. Compiled by Frances Krasnow, Guggenheim Dental Clinic.—117.

Low Calcium Diet: Dental Effects. C. A. H. Smith and R. F. Light.

Feeding a low calcium diet to growing dogs resulted in gross abnormalities of the long bones, but had very little effect on the development of the permanent teeth. Three dogs were weaned and placed on calcium-deficient diets, two on a diet containing 0.027 per cent calcium and 0.153 per cent phosphorus and one on a diet with 0.196 per cent calcium and 0.427 per cent phosphorus. The diets were adequate in other nutrient factors and the animals were continued on these diets throughout the development of the permanent teeth. Gross skeletal abnormalities occurred, including bowing of the legs and spontaneous fractures, but the teeth showed little if any structural modification. The results indicate that the teeth are more resistant to the effects of calcium deficiency during the period of rapid development than are the long bones.

Transplantation of Developing Tooth Germs in Mandible of Cat; Roentgenologic Study. Harry H. Shapiro and Bernice L. Maclean.

Developing permanent canine or incisor teeth of kittens were transplanted in place of permanent canine or premolar teeth of older animals and, in a few cases, of younger animals approximately the same age as the donors. Intra-oral roentgenograms taken at frequent intervals after operation indicated that the transplant, if intact, became established in the alveolar socket of the host, continuing its development. Injured transplants underwent gradual resorption. A decrease in radiopacity during the first three to five weeks after operation was evident in transplanted canine germs, but inconspicuous in transplanted incisor germs the crowns of which were completely formed at the time of operation. Transplants persisting beyond five weeks showed a gradual reappearance of opacity.

Role of Actinomyces Israeli in Salivary Calculus Formation. S. R. Citron.

Various hypotheses have been advanced to explain the formation of salivary calculus. Naeslund considered Actinomyces and Leptotrichia as involved in tartar formation.

Six strains of *A. israeli* identified by cultural and morphologic characteristics were studied to determine certain of their biochemical activities. These strains did not decompose protein material into such simpler compounds as indol or hydrogen sulfide; did not raise the alkalinity of the medium, and did not precipitate calcium from inorganic calcium chloride in the absence of phosphate ions. The six strains did produce alkaline phosphatase. *A. israeli* was found to be able to produce alkaline phosphatase; which may precipitate calcium phosphate from saliva and initiate salivary calculus formation.

Effect of Vibration upon Dental Pulp and Periosteum of White Rats. J. S. Restarski.

Exposure of white rats to a vibration of 0.05 inch amplitude at a frequency of 2,600 cycles per minute, eight hours daily, six days a week for twenty-eight days, did not affect the rate of growth of the incisor teeth, or the calcification of the dentin as shown by the constant average width and number of measurable dark plus light incremental rings in the dentin. Histologic examination of the dentin, pulp, alveolar periosteum, alveolar bone and the structures of the temporomandibular articulation failed to disclose any greater variation of cellular changes than occurs normally.

Effects of Various Ions on Enamel Solubility. Michael G. Buonocore and Basil G. Bibby.

The results of treatment with 1/1,000 solutions of soluble compounds of several elements on the solubility of powdered enamel in an acetate buffer of pH 4 are compared with the effectiveness of a 1/1,000 solution of sodium fluoride. It is found that Cn^{++}, Ag^{+}, So_4^{-}, Sr^{++}, Zn^{++} ions are less effective than F^{-} ion, whereas oxalate compares favorably. Solutions containing Pb^{++} and lead fluoride show marked ability to reduce the solubility of enamel, being, respectively, 2 and 3.5 times as effective as sodium fluoride. The possible clinical use of saturated solutions of PbF_2, topically applied, as a preventive measure in the control of dental decay is suggested.

Trichlorethylene as a General Anaesthesia in Dental Surgery: A Report Based on 2,000 Cases. A. H. Galley. Lancet 249:597, November 1945.

Three methods for the use of trichlorethylene as a general anesthesia in dental surgery are described: the single dose method; the nitrous oxide, oxygen and trichlorethylene by the nasal route method, and the nitrous oxide, oxygen and trichlorethylene by the endotracheal route method. The indications for, and precautions to be taken in, the use of each method are also given.—*S. Wah Leung.*

Deposition of Radioactive Phosphorus in Osseous and Dental Tissues as Demonstrated by the Autoradiographic Technic. Antonio Couceiro. Memorias do Instituto Oswaldo Cruz. 41:541, 1944.

The author compared the histologic and autoradiographic results of injection of radiophosphorus upon the young osseous and dental structures. Mice 24 hours old were injected subcutaneously with 0.025 ml. of a radiophosphate solution, which contained approximately 67 grains of phosphate and a radioactivity that decreased from 42 to 11 microcuries. The animals were killed after a period that varied between two and seventy-two hours after injection, and the sternum, femur, mandible, vertebral column and feet were removed and fixed in neutral formalin. The paraffin method was used for obtaining 10 micra thick sections. These were then covered with a 0.5 per cent collodion solution. In a dark room, the sections were then placed in close contact with the emulsion side of a photographic plate, and were left for a time that varied with the radioactive intensity of the injected solution. The sections to be stained were treated with 2 per sent silver nitrate, distilled water, 1 per cent pyrogallol, distilled water, 5 per cent thiosulfate and abundant water, and finally

stained with hematoxylin-eosin. Study of a considerable number of autoradiographs revealed a practically equal deposition of radioactive phosphorus regardless of the time elapsed between injection and killing of the animals. Autoradiographs from sections containing both osseous and dental tissues showed a more intensive deposition of radioactive phosphorus in the latter. This was interpreted as due to the fact that the phosphorus present in enamel and dentin has a stronger organic linkage, thus being less subject to diffusion currents and more resistant than the osseous tissue to histologic manipulations. Comparing the autoradiographic and the stained preparations, the author found that the autoradiographic images were practically identical in configuration with the areas showing an affinity for silver nitrate.—*Humberto Granados.*

Etiology and Inheritance of Inequalities in the Jaws of Sheep. J. E. Nordby, C. E. Terrill, L. N. Hazel and J. A. Stoehr. Anat. Rec. 92:225, July 1945.

The most common defects in structural harmony of the jaws of sheep are the "overshot" and "undershot" conditions. In the former, the lower jaw appears too short; in the latter, the lower jaw appears too long. The present study was made on sixteen normal mature ewes, nineteen mature ewes with overshot jaws and nine ram lambs of 8 months with overshot jaws.

Sheep with overshot jaws had longer skulls and shorter mandibles than normal animals. The mandible was affected along its entire length, but the space occupied by the molar teeth was less affected than the remainder of the jaw. The maxilla was the only structure of the upper jaw that was appreciably longer in ewes with overshot jaws than in normal ewes. Linear skull measurements were more variable in animals with overshot jaws than in normal animals. However, positive correlations were found between upper and lower jaw structures in both the group with overshot jaws and the normal group, indicating that general factors are important in determining variation in different skeletal structures despite the disharmony shown by the overshot condition. The angles of the mandible did not appear to be disturbed. A tendency for the angles of the incisor teeth to compensate for inequalities of the jaws was apparent in normal animals. This compensatory tendency was absent in the animals with overshot jaws studied.

Marked inequality of the upper and lower jaws occurred in about 1.4 per cent of the offspring from a large flock of sheep. Experimental matings in which one or both parents had overshot jaws produced 16.4 per cent defective offspring. Defective lambs were slightly smaller than normal, but no reduction in viability to weaning age was apparent. Inequality of the jaws was found to increase from birth to weaning to yearling age. Experimental matings indicated that interactions of several pairs of genes were probably involved.—*J. E. Gilda.*

Radiotherapy in Actinomycosis. E. Stockkeland. Acta radiol., Suppl. 50:1943.

Actinomycosis may localize in a number of sites, thus giving rise to its classification according to cervicofacial, abdominal, thoracic and other types. The present report is based on twenty-eight cases of the first type, eight of the second and one each of the others. In the cervicofacial type of the disease, the prognosis of treatment is best and cure may be anticipated in practically all cases. In all cases, the therapeutic results will greatly depend upon the time at which treatment is started. The protracted fractional method is used, since it provides conditions for the largest doses at minimal risk of lasting radiation injuries. In cervicofacial forms with primary site of infection in the maxillary region, attention is fixed upon possible dental infection foci. Infected and carious teeth are capable of protracting the course of the disease and impeding the healing.—*J. E. Gilda.*

Factors Influencing the Destructive Effects of Acidic Beverages on the Teeth of White Rats and Hamsters. R. A. Gortner, Jr., J. S. Restarski, J. G. Bieri and C. M. McCay. Arch. Biochem. 8:405, December 1945.

Rats given solutions of citric, lactic, phosphoric and sulfuric acids to drink were studied to determine the effects of these acids on the molars. At the same pH (2.6), citric and lactic acid solutions, in contrast with

the action of the other two acids studied, caused severe damage to the lower molars of rats but, in most cases, had relatively much less effect on the upper molars. Comparable results were noted when Navy-issue synthetic lemonade was used. The presence of 10 per cent sucrose, glucose or maltose increased the tooth-destructive properties of phosphoric acid solutions *in vivo*. Lactose had no such effect. Citric, lactic and sulfuric acid solutions were not influenced in their decalcifying properties by the inclusion of 10 per cent sucrose. Addition of 1, 5, 10 and 20 parts per million of fluorine to citric acid solutions ingested by hamsters provided, in most instances, partial protection against tooth destruction by acid. The markedly different action of citric acid *in vivo* on the upper versus the lower molars of rats was not observed in the hamster. *In vitro* studies on the decalcification of pulverized human enamel by various acids, both alone and in the presence of sucrose or saccharin, yielded results differing in several respects from those noted *in vivo* with the rat. Whereas phosphoric acid-sucrose caused greater tooth destruction than did citric acid *in vivo*, this situation was reversed *in vitro*. Also, *in vitro* sucrose failed to increase the decalcification of enamel by phosphoric acid. When fluoride was added to the acid solutions, however, the enamel solubility *in vitro* was lowered by 14 to 30 per cent.—*J. E. Gilda.*

Cancer of the Lip. B. Ebenias. Acta radiol., Suppl. 48:1943.

At the Radiumhemmet, Stockholm, from the years 1910 to 1935, lip cancers made up 4.8 per cent of 14,051 cases of cancer, 43.7 per cent of 1,555 cases of cancer in the lips and oral cavity and 21.3 per cent of 3,193 cases of cancer of the lips and skin. The average age of the patients was 64.0 years for the men, 68.7 years for the women and 64.3 years for both sexes. The number of cases was greatest in the age group 65 to 74 years. Fifty-seven per cent of the cases were in the age group 67 to 79 years. The 778 cases discussed in this report consisted of 92.4 per cent men and 7.6 per cent women, a ratio of 12.2 to 1. Endogenous factors do not seem to be of greater significance in lip cancer than in other forms of malignant tumor. It was shown that outdoor work predisposes to lip cancer. Proof was provided that the assumed connection between pipe smoking and lip cancer actually exists and that this form of the use of tobacco is a significant predisposing factor to lip cancer. Leukoplakia, hyperkeratosis, chronic ulcers, rhagades and chronic cheilitis occurred in at least 36 per cent of the present lip cancer material but in only 5 per cent of a control series of 100 men over 50 years of age. The duration, calculated from the first symptom until admission, varied between one month and six years and averaged 10.5 months. The type of tumor, position, size of lesion and frequency of metastasis are discussed in some detail. All of the 471 tumors histologically examined were squamous cell cancers. Study of the various modes of treatment was carried out. It is emphasized that only the absolute and relative cure rates can be used as a basis for comparison of treatment results. The prognosis is described as relatively good, since no more than 20.2 per cent of 356 primary cases for which ten-year results could be calculated have died of lip cancer. —*J. E. Gilda.*

Atopic Sensitivity to Caroid (Papain): Report of a Case with Discussion of Some of the Properties and Uses of the Drug. Howard Osgood. J. Allergy 16: 245, September 1945.

Caroid, a proprietary brand of papain, contains proteolytic enzymes. It is an ingredient of Caroid Tooth Powder[1] and other "Caroid" preparations.

A married woman, 39 years of age, underwent bilateral vein ligations for varicosities of the legs. One wound sloughed open, and, in order to clear up the slough, caroid powder was dusted on for three or four weeks. The patient was thus sensitized to papain. Approximately two years later, she developed allergic symptoms including sneezing and coryza within two days after her husband started to use Caroid Tooth Powder. Paroxysmal cough and asthma developed within two weeks. The patient obtained relief from the symptoms only during brief sojourns in the hospital. She herself apparently used the Caroid Tooth Powder only once.

1. Caroid Dental Powder—Not Acceptable for A.D.R. J.A.D.A. 29:639, April 1941.

After some months had passed, her physician, who had had some experience with papain, observed a can of Caroid Tooth Powder in the patient's home. The patient then recalled that her symptoms began a few days after her husband began using the tooth powder. During the patient's next stay in the hospital, all traces of Caroid Tooth Powder were removed from the home. Her allergic symptoms did not recur.

The author cites six cases of reported allergic sensitivity to papain in addition to the patient whom he observed.

Later, extensive tests demonstrated that the patient had a true atopic sensitivity to papain.

The author lists the following "oral preparations containing papain": all the "Caroid" preparations, American Ferment Co.; Caripeptic Liquid and "Carica" preparations, The Upjohn Co.; Bisodol; Digestone Elixir, Robert McNeil; Elixir Caricans, Fraser Tablet Co.; Protenzamyl, R. J. Strasenburgh Co.; Liquor Diastos, Sharp & Dohme, Inc.; Panpasoda, G. D. Searle & Co., Inc.; C. M. S. Compound, Walker Pharmacal Co.

The author states that sensitivity to papain is atopic in type and is not uncommon.—*Donald A. Wallace.*

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Titles marked with an asterisk are reviewed below.

Study of Congenitally Missing Second Premolars and Space Factors in the Arches. Clarence P. Oliver, Peter J. Brekhus and George Montelius, Minneapolis, Minn.—217.

*Electron Microscope Study of the Mechanism of Fluorine Deposition in Teeth. Charles H. Gerould, Midland, Mich.—223.

*Effect of Sodium Fluoride on the Solubility of Calcium Phosphate, Tooth Enamel and Whole Teeth in Lactic Acid. James J. Rae and Charles T. Clegg, Toronto, Canada—235.

*Observations on Induced Caries in Rats. V. Effects of Excessive Sugar in the Diet. F. J. McClure, Bethesda, Md.—239.

*Studies on the Oxidation-Reduction Potentials of Saliva. L. L. Eisenbrandt, Ph.D., Kansas City, Mo.—247.

Evaluation of Antimicrobial Agents. The Germicidal Activity of a Synthetic Detergent, DC-12. M. E. Pierce and E. B. Tilden, Chicago, Ill.—259.

International Association for Dental Research. Scientific Proceedings of the New York Section, June 7, 1945. Frances Krasnow, Ph.D., New York, N. Y.—267.

Electron Microscope Study of the Mechanism of Fluorine Deposition in Teeth. Charles H. Gerould.

The electron microscope, using the polystyrene-silica replica technic, has been found useful in studying both the fundamental histology and the pathology of tooth structures. Electron micrographs show a difference in the acid etched microstructure of normal enamel and dentin as compared with enamel and dentin fluorosed by systemic ingestion. This difference is believed to be due to the deposition of fluorine as acid resistant Ca-fluor-apatite throughout the hydroxy and carbonate apatites. Such fluor-apatite deposition takes place only during the period of calcification of the tooth structure.

Electron and x-ray diffraction with electron microscopy have indicated that fluorine entering a tooth following the completion of calcification (during topical application of soluble fluorides) is deposited as acid resistant CaF_2.

A possible explanation of the fluorine-dental caries relationship may be found in the fact that both acid-resistant fluorides and fluoride ions are concentrated at the point where dissolution of tooth enamel is carried on by the acid-forming bacteria. Such fluoride ions may eventually reach a sufficient concentration at the point of attack to inhibit acid formation and bacterial growth, resulting in cessation of decay.

Effect of Sodium Fluoride on the Solubility of Calcium Phosphate, Tooth Enamel and Whole Teeth in Lactic Acid. James J. Rae and Charles T. Clegg.

The addition of small amounts of sodium fluoride to solutions of lactic acid reduces the apparent solubility of calcium phosphate and powdered tooth enamel in the acid. The high phosphate and low calcium values for the supernatants indicate that the apparent lowering in the solubility caused by the addition of the fluoride is due to the precipitation

of calcium fluoride. Sodium oxalate has an analogous effect.

The inhibitory effect of sodium fluoride and sodium oxalate on *in vitro* decalcification of teeth by lactic acid at pH values below 4 may be due to the same process proceeding at a slower rate.

Observations on Induced Caries in Rats. V. Effects of Excessive Sugar in the Diet. F. J. McClure.

Contrary to reported results of similar studies, groups of white rats developed a significant incidence of microscopic dental caries when fed synthetic diets containing excessive quantities of sucrose and glucose. Control rats, fed a similar diet in which starch replaced the sugars, developed no caries. Failure to duplicate the initial success with excessive sugar diets is attributed to a reduced susceptibility to caries in animals available for subsequent studies. There was some evidence that fluorine exposure during the period of tooth formation may have been one of several unknown and uncontrolled pre-experimental factors which caused the erratic caries response among the several groups of rats. A diet containing 70 per cent granulated sugar had an unmistakably abrasive result which was noted on the occlusal surfaces and particularly in the exposed dentin of the rats' molar teeth.

Studies on the Oxidation-Reduction Potentials of Saliva. L. L. Eisenbrandt.

Electrometric determinations of oxidation-reduction potentials were made upon a total of 1,555 samples of unstimulated saliva immediately after removal from the mouth. Seven subjects were tested at bi-hourly intervals between 9 a.m. and 5 p.m. during successive five-day periods for twelve months. The data were studied statistically.

The mean eH was + 301 mv. Marked changes occurred during the year which varied with the month and the season. The eH decreased during the late fall and early winter; the lowest was + 248 mv. for November. The monthly mean eH increased during the late summer to + 394 mv. for September. The individual eH readings did not differ significantly from one another at yearly, monthly or bi-hourly intervals. The pH of saliva was tested at the same time. This value varied with seasons, months and bi-hourly periods and with the subject. The mean was 6.64.

In general, temporary oxidation-reduction potentials of unstimulated saliva were a function of month and season rather than a function of the individual.

Curettage and Socket Dressings Used After Dental Extractions. Louie T. Austin and Consultants. J. D. Educ. 8:343, April 1944.

In the opinions of the seven authorities included in this symposium, forceful curettage is not indicated at any time. The curet should not be used during the acute phase of an infection, but the careful removal of a granuloma or lining membrane of a cyst cavity is recommended as an aid to quick recovery. The pack is used to insure drainage from the socket area and to limit the size of the blood clot required to fill the extraction space. Gauze dressings should not be changed oftener than every four to six days. The normal blood clot is the best possible dressing for the extraction wound. The sulfonamides are a useful addition to our therapeutic measures but their use in routine extractions is not justified.—*Charles F. Bodecker.*

Shall We Increase Our Orthodontic Instruction to Meet the Demand of Post-War Practice? George R. Moore. J. D. Educ. 9:49, October 1944.

The increased role which orthodontic guidance and treatment play in preventive dentistry makes it desirable adequately to prepare the professional dentist with understanding in this department. Time is required to acquaint the student thoroughly with the multiple and complicated biologic processes which have a tremendous influence on the developing dentition. With these points in mind, instruction in orthodontics should be a systematic part of the professional dental curriculum beginning at least with the second year in a four-year program. Instruction should include thorough training on the details of dento-facial growth, etiology of irregularities and perverted growth, diag-

nosis and the application of simple preventive, interceptive and treatment technics.

Not the least advantage to be gained from such a program would be the possibility of tying orthodontic concepts and procedures more closely to the activities of the other departments in the dental school. A less intensive orthodontic program precludes such interdepartmental collaboration, with the result that orthodontics remains outside the field of health service as has been the case for too long a period.

Bite and Dental Injury. F. Ronchese. J.A.M.A. 127:1050, April 21, 1945.

Distinction is made between an injury inflicted by the teeth and a bite injury. Illustrations are provided of dental injuries upon the fingers resulting from the pressure of finger sucking or actual chewing of the skin. The conspicuous warty lesions are not uncommon and are often diagnosed as a wart, keloid, sarcoid, mycotic growth or epithelioma.—*J. E. Gilda.*

Bacterial Activity and Tissue Tolerance; Their Role in Prosthodontia. H. A. Bartels and Consultants. J. D. Educ. 9: 57, October 1944.

Some instances of denture sore mouth are due to factors other than the fit or the pressure of the denture. Bacteria may cause inflammatory reactions, either by way of infection or through the by-products of their metabolic activities. Odors emanating from the mouths of denture wearers are the result of the decomposition of food particles by bacterial enzymes. The importance of instructing the patient in the means and the necessity of keeping his dentures clean is stressed.

Denture sore mouth may also result from lowered tissue tolerance of the oral mucous membrane. This may be due to systemic disturbances such as blood dyscrasias, dietary deficiencies or infections such as syphilis. The occurrence of aphthous ulcers on the mucous membrane adjacent to the denture is noted as a cause of discomfort.

Allergy due to denture materials has been reported. Whether such cases are true instances of allergy or whether they are the result of bacterial activity is discussed.

Some Pertinent Thoughts on Full Dentures. Zachary Blum. J. 2nd Dist. D. Soc. (N. Y.) 31:344, December 1945.

Blum discusses the responsibility shared by both dentist and patient in the successful construction and use of full dentures. The dentist must have a thorough knowledge of the fundamental principles underlying denture construction and the ways in which these principles may be applied to the patient, whose favorable or unfavorable anatomic, physiologic, histologic and psychologic condition makes him the unpredictable factor in the success of the undertaking. The patient's responsibility consists chiefly in following the dentist's minutely detailed instructions for the use and servicing of the dentures.

Periodontology in Dental Education. Clifton O. Dummett. J. D. Educ. 9: 4, October 1944.

Failure to convince the dental profession of the importance of periodontology has been the main reason that this subject is not being as effectively taught as it should be. The recognition of periodontal involvement during oral diagnosis should be stressed as well as the fact that the retention of teeth is dependent upon the maintenance of healthy periodontal tissues. The author believes that such teaching will assist in effecting greater interest in the science of periodontology.

Dental prophylaxis is an operation that has been taken for granted with the result that dentists often overlook it. Students should be taught the importance and necessity of thoroughly cleaning the mouth and keeping all of the oral tissues healthy. During undergraduate years, these points should be indelibly impressed upon the minds of future dentists.

DEATHS

Koch, Edward W., M.A., M.D., dean of the School of Medicine of the University of Buffalo and from 1936 to 1944 also dean of the School of Dentistry, died February 9, 1946. Dean Koch was keenly interested in dental education and in 1929, as dean of the medical school, he wholeheartedly cooperated with the dental faculty in the inauguration of a program whereby dental and medical students were given a common training for two years in the basic sciences under the jurisdiction of the medical faculty.

After the death in 1935 of Dr. Daniel H. Squire, dean of the dental school, Dr. Koch became dean of the divisions of medicine and dentistry in 1936. He served as dean of both schools until 1944. Dr. Koch continued to serve as a member of the executive committee of the dental school faculty until the time of his death.—*R. W. Groh.*

Agern, Arthur C., Los Angeles, Calif.; Dental School, Northwestern University; died January 21; aged 62.

Bailyn, Charles M., West Hartford, Conn.; Kansas City-Western Dental College; died January 26; aged 54.

Bear, H. A., Peoria, Ill.; Dental School, Northwestern University; died January 4; aged 73.

Becker, William A., Chicago, Ill.; College of Dentistry, University of Illinois; died February 10; aged 52.

Braley, John C., Pasadena, Calif.; College of Dentistry, State University of Iowa; died December 12.

Bremner, J. A., Hinckley, Ill.; died February 13; aged 62.

Davis, John D., Sterling, Ill.; Dental School, Northwestern University; died December 22; aged 69.

Davis, Sheldon G., Washington, D. C.; School of Dentistry, Georgetown University; died December 15; aged 75.

Denton, B. H., Omaha, Nebr.; School of Dentistry, Creighton University; died January 28; aged 54.

Doss, Clinton H., Ipava, Ill.; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati; died January 4; aged 69.

Durant, Alfred, Ilion, N. Y.; School of Dentistry, University of Buffalo; died December 29; aged 38.

Estrella, Salvadore O., Houston, Texas; College of Dentistry, University of California; died January 28; aged 46.

Graham, William C., Davenport, Ohio; College of Dentistry, Ohio State University; died January 5; aged 71.

Gray, Lewers D., Denver, Colo.; Kansas City-Western Dental College; died December 17.

Green, A. B., Jackson, Mich.; Dental Department, George Washington University; died January 22.

Halpern, John I., Philadelphia, Pa.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania; died January 24; aged 66.

Harrison, Charles J., Cuyahoga Falls, Ohio; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania; died January 27; aged 67.

Henry, Earl O., Knoxville, Tenn.; died July 30.

Hines, Claude E., Memphis, Tenn.; Atlanta-Southern Dental College; died October 5; aged 73.

Houle, F. H., Great Falls, Mont.; College of Dentistry, North Pacific College of Oregon; died January 9.

Hunter, Edward M., Nashville, Tenn.; School of Dentistry, Vanderbilt University; died January 7; aged 69.

James, Wilfred E., Cleveland, Ohio; died January 16; aged 50.

Jones, William I., Columbus, Ohio; College of Dentistry, Ohio State University; died January 21; aged 78.

Kelly, E. V., Texas, Md.

Larkin, Hugh A., Chicago, Ill.; College of Dentistry, University of Illinois; died February 4; aged 60.

Laughlin, James R., Chicago, Ill.; Dental School, Northwestern University; died February 17; aged 71.

Lawton, Harry C., St. Paul, Minn.; School

of Dentistry, University of Minnesota; died January 29.

McCoy, Howard C., Albany, Mo.; Kansas City-Western Dental College; died December 20; aged 41.

McKinstry, William S., Nashville, Tenn.; School of Dentistry, Vanderbilt University; died January 12; aged 69.

McMahon, Hugh A., New York, N. Y.; died January 30; aged 73.

MacNaughton, Herbert J., Penn Yan, N. Y.; died January 20; aged 75.

Matthews, William H., Dallas, Texas; School of Dentistry, University of Denver; died January 20; aged 72.

Meads, John J., Medford, Mass.; died January 20; aged 57.

Miller, Benjamin F., Pomona, Calif.; School of Dentistry, University of Michigan; died January 3; aged 91.

Mullen, Robert E., Ironwood, Mich.; Dental School, Marquette University; died January 11; aged 58.

Pidgeon, William C., Altoona, Pa.; School of Dentistry, University of Pittsburgh; died January 26.

Pingrey, C. O., Neodesha, Kan.; College of Dentistry, State University of Iowa; died December 31; aged 71.

Ramelli, Emile H., New Orleans, La.; School of Dentistry, Tulane University of Louisiana; died January 16; aged 65.

Reardon, Joseph E., Boston, Mass.; Tufts College Dental School; died December 15; aged 65.

Reck, Bruno J., Mahnomen, Minn.; Chicago College of Dental Surgery, Loyola University; died January 22; aged 70.

Roland, Charles M., McKees Rocks, Pa.; School of Dentistry, University of Pittsburgh; died January 20; aged 65.

Russell, Louis H., Columbia, S. C.; died January 20; aged 73.

Smith, L. W., Louisville, Ky.; died in 1945.

Strahan, Arthur H., Putnam, Conn.; died December 12; aged 84.

Swift, H. M., Hollywood, Calif.; died October 23.

Syverud, H. M., Canton, S. Dak.; Dental School, Northwestern University, 1911; died October 27; aged 57.

Tabbey, Maurice, Philadelphia, Pa.; School of Dentistry, Temple University; died December 23; aged 49.

Takeda, Isamu, Los Angeles, Calif.; died January 10.

Taylor, Harry B., Washington, D. C.; died September 30; aged 78.

Taylor, J. Wilson, Renton, Wash.; School of Dentistry, North Pacific College of Oregon; died October 10; aged 41.

Temm, William B., St. Louis, Mo.; died January 3.

Tharp, Horace, Chicago, Ill.; Dental School, Northwestern University, 1908; died December 5; aged 57.

Thwaites, William H., Grand Rapids, Mich.; School of Dentistry, University of Michigan; died September 28; aged 60.

Tidball, Fred, Garretsville, Ohio; died January 16.

Tilton, George F., Denver, Colo.; School of Dentistry, University of Denver, 1902; died August 1; aged 62.

Tilton, Harold A., Farmingdale, N. J.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1914; died August 10; aged 52.

Tingle, W. J., Louisville, Ky.; died November 7; aged 63.

Topping, D. L., Clinton, Iowa; College of Dentistry, State University of Iowa, 1911; died June 14; aged 55.

Townsend, Charles G., Charleston, W. Va.; Cincinnati College of Dental Surgery; died July 20; aged 68.

Trigg, Alfred, Milwaukee, Wis.; School of Dentistry, Washington University, 1904; died October 21; aged 71.

Tubbs, Winifred, Des Moines, Iowa; College of Dentistry, State University of Iowa, 1896; died July 10; aged 72.

Tully, Edward A., Hartford, Conn.; Baltimore College of Dental Surgery, University of Maryland; died November 30; aged 35.

Tyo, Harry A., Seattle, Wash.; School of Dentistry, North Pacific College of Oregon; died September 29; aged 49.

Vanderslice, C. M., Philadelphia, Pa.; School of Dentistry, Temple University, 1889; died in 1945.

Van Slyke, C. A., Benson, Minn.; School of Dentistry, University of Minnesota, 1920; died October 16; aged 49.

Vaughan, William S., Mangum, Okla.; School of Dentistry, University of Louisville, 1918; died June 16.

Voegtlen, John S., South Orange, N. J.;

Pennsylvania College of Dental Surgery, 1890; died August 21; aged 76.

Vroom, Ross, Boston, Mass.; Tufts College Dental School; died November 13.

Wallace, Fred, New Haven, Conn.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania; died November 3; aged 73.

Wands, Henry C., Chippewa Falls, Wis.; Chicago College of Dental Surgery, Loyola University, 1905; died July 21; aged 59.

Ward, Clarence E., Los Gatos, Calif.; died October 20; aged 73.

Ward, Claude A., Jr., Fort Worth, Texas; School of Dentistry, University of Louisville, 1905; died September 25.

Ward, George E. T., Orleans, Mass.; died in November; aged 77.

Washburn, R. J., Rugby, N. Dak.; College of Dentistry, University of Minnesota, 1904; died July 20; aged 67.

Watkins, Alvah Todd, Garden Grove, Calif.; Kansas City-Western Dental College, 1905; died June 16; aged 72.

Weinstein, Jacob, Chicago, Ill.; Chicago College of Dental Surgery, Loyola University, 1922; died in December; aged 60.

Wetsel, A. L., Dallas, Texas; Atlanta-Southern Dental College, 1918; died July 10.

Wheeler, Henry L., Roselle, N. Y.; College of Dentistry, New York University, 1892; died August 9; aged 80.

Whiteside, Charles E., Reno, Nev.; School of Dentistry, Indiana University, 1893; died June 30; aged 86.

Whitten, G. B., Westmont, Pa.; died November 28; aged 74.

Willmore, Charles M., West Frankfort, Ill.; Barnes Dental College, 1911; died November 22.

Wilson, George B., Jamestown, Calif.; School of Dentistry, College of Physicians and Surgeons, 1911; died October 3; aged 61.

Wolf, Joseph, Newark, N. J.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1916; died January 4; aged 50.

Wolfe, Vincent M., Davenport, Iowa; Chicago College of Dental Surgery, Loyola University, 1901; died August 11; aged 71.

Wolff, Fred W., Portland, Ore.; died in November.

Wood, Peter Henry, Allston, Mass.; School of Dentistry, Temple University, 1895; died July 26; aged 76.

Wood, Ralph A., Pawtucket, R. I.; School of Dentistry, Temple University, 1897; died November 5.

Yarber, James J., Chicago, Ill.; College of Dentistry, University of Illinois, 1930; died June 14.

Yeargain, George W., Sea Cliff, N. Y.; School of Dentistry, Washington University; died November 13; aged 91.

Zeve, Harry L., Youngstown, Ohio; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1916; died December 12; aged 51.

Zweig, J., New York, N. Y.; College of Dentistry, New York University, 1923; died November 30; aged 74.

MEETINGS AND ANNOUNCEMENTS

Meetings of State Societies

Alabama Dental Association, Birmingham, Thomas Jefferson Hotel, April 9-11. Angus M. Sellers, 812 Empire Bldg., Birmingham, Secretary.

Connecticut State Dental Association, Hartford, Hotel Bond, June 5-7. E. S. Arnold, 37 Linnard Road, West Hartford 7, Secretary.

Dental Society of the State of New York, New York City, May 13-16. Charles A. Wilkie, 1 Hanson Pl., Brooklyn, Secretary.

Georgia Dental Association, Atlanta, Ansley Hotel, May 12-15. R. H. Murphy, 605 Bankers Insurance Bldg., Macon, Secretary.

Iowa State Dental Society, Des Moines, Hotel Fort Des Moines, May 6-8. A. N. Humiston, 417 Higley Bldg., Cedar Rapids.

Kentucky State Dental Association, Louisville, Brown Hotel, April 1-3. J. L. Walker, 640 Barbee Way South, Louisville 8, Secretary.

Louisiana State Dental Society, Baton Rouge, April 4-6. Julian S. Bernhard, 407 Medical Arts Bldg., Shreveport 45, Secretary.

Maine Dental Society, Portland, Eastland Hotel, June 27-29. Alonzo H. Garcelon, Augusta, Secretary.

Massachusetts State Dental Society, Boston, Hotel Statler, May 6-9. Philip E. Adams, 106 Marlborough St., Boston, Secretary.

Michigan State Dental Society, Detroit, April 15-17. H. C. Gerber, Jr., 1514 Olds Tower Bldg., Detroit, Executive Secretary.

Mississippi Dental Association, Jackson, May 26-29. O. L. Colee, Magnolia, Secretary.

Missouri State Dental Association, St. Louis, Jefferson Hotel, April 14-17. C. W. Digges, Exchange National Bank Bldg., Columbia, Secretary.

Montana State Dental Association, Butte, Finlen Hotel, May 2-4. F. E. Laing, 401 Hart-Albin Bldg., Billings, Secretary-Treasurer.

New Jersey State Dental Society, Atlantic City, May 21-24. J. Ward Weaver, 47 South Main St., Pleasantville, Convention Director.

North Carolina Dental Society, Pinehurst, Carolina Hotel, May 6-8. C. W. Sanders, Benson, Secretary-Treasurer.

Oklahoma State Dental Society, Tulsa, Mayo Hotel, March 31-April 3. Eugene Wise, Medical Arts Bldg., Tulsa, Secretary.

Pennsylvania State Dental Society, Pittsburgh, May 7-9. C. J. Hollister, 217 State St., Harrisburg, Executive Secretary.

South Carolina State Dental Association, Columbia, Wade Hampton Hotel, April 28-30. P. B. Hair, Spartanburg, Secretary-Treasurer.

Vermont State Dental Society, Burlington, May 22-23. F. A. Reid, Windsor, President.

Wyoming State Dental Association, Sheridan, June 23-26. Jack D. McNiff, Laramie, Secretary.

Meetings of State Boards of Dental Examiners

Alabama State Board of Dental Examiners, Birmingham, May 13. Farrar McCrummen, Woodward Bldg., Birmingham, Secretary-Treasurer.

Arizona State Dental Board, Phoenix, April 22. R. K. Trueblood, 25 North Second Ave., Glendale, Secretary.

California State Board of Dental Examiners, San Francisco, University of California, June 24; San Francisco, College of Physicians and Surgeons, August 5; Los Angeles, University of Southern California, September 16. Kenneth I. Nesbitt, 515 Van Ness Ave., Room 203, San Francisco 2, Secretary.

Colorado State Board of Dental Examiners, Denver, June 17-21. Harry D. Stanwood, 724 Republic Bldg., Denver 2, Secretary-Treasurer.

Florida State Board of Dental Examiners, Jacksonville, April 8-11. A. W. Kellner, P. O. Box 155, Hollywood, Secretary.

Indiana State Board of Dental Examiners, Indianapolis, May 13-16 (dentistry and dental hygiene). Carl A. Frech, Gary National Bank Bldg., Gary, Secretary.

Maine State Board of Dental Examiners, Augusta, State House, June 30-July 1. Carl W. Maxfield, 31 Central St., Bangor, Secretary.

North Carolina State Board of Dental Examiners, Raleigh, April 1. Wilbert Jackson, Rich Bldg., Clinton, Secretary.

North Dakota State Board of Dental Examiners, Fargo, Gardner Hotel, July 8-11. Richard Krause, Bismarck, Secretary-Treasurer.

Oklahoma State Board of Governors of Registered Dentists, Oklahoma City, June 24-27. W. T. Longwell, First National Bank Bldg., Frederick, Secretary.

Tennessee State Board of Dental Examiners, Memphis, June 10-14. James J. Vaughn, 1005 Medical Arts Bldg., Nashville 3, Secretary.

West Virginia State Board of Dental Examiners, West Liberty, June 24-27. R. H. Davis, Clarksburg, Secretary.

Other Meetings

Dental Hygienists Association of the City of New York, New York City, Hotel Pennsylvania, April 5. Grace E. Clinchy, 67-134 Clyde St., Forest Hills 2A, Publicity Chairman.

District of Columbia Dental Society Five State Post Graduate Clinic, Washington, D. C., Hotel Statler, May 24-27. Edward D. Leifer, 508 Colorado Bldg., Washington 5, General Chairman.

First District Dental Society of New York, New York City, Hotel Pennsylvania, May 11, 7 p.m. Dinner in honor of Waldo H. Mork.

Hermann M. Biggs Memorial Lecture, New York City, New York Academy of Medicine (Hosack Hall), April 4. Open to general public. E. H. L. Corwin, New York Academy of Medicine, New York, Executive Secretary.

Industrial Health Conference, Chicago, Sherman Hotel, April 8-13. To be attended by: American Association of Industrial Dentists; American Association of Industrial Physicians and Surgeons; National Conference of Governmental Hygienists; American Industrial Hygiene Association; American Association of Industrial Nurses. James M. Dunning, President of American Association of Industrial Dentists, 23 Buckingham St., Cambridge, Mass.

Pacific Coast Society of Orthodontists, San Francisco, May 27-29. Earl F. Lussier, 450 Sutter Bldg., San Francisco, Secretary.

Internships, Externships, Residencies and Fellowships

Eastman Dental Dispensary, Rochester, N. Y. Director, Harvey J. Burkhart.

International Grenfell Association, Staff Selection Committee, 56 Fifth Ave., New York City.

Joseph Samuels Dental Clinic of the Rhode Island Hospital, Providence, R. I. Director, Ernest A. Charbonnel.

Research and Educational Hospital, University of Illinois Medical Center. Dean, College of Dentistry, University of Illinois, 808 South Wood St., Chicago 12.

Richmond Freeman Memorial Clinic for Infants and Children, Dallas, Texas. Executive Director, Dora B. Foster, 3617 Maple Ave., Dallas.

Walter G. Zoller Memorial Dental Clinic, University of Chicago. Address Director, Walter G. Zoller Memorial Dental Clinic, University of Chicago, Chicago 37.

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